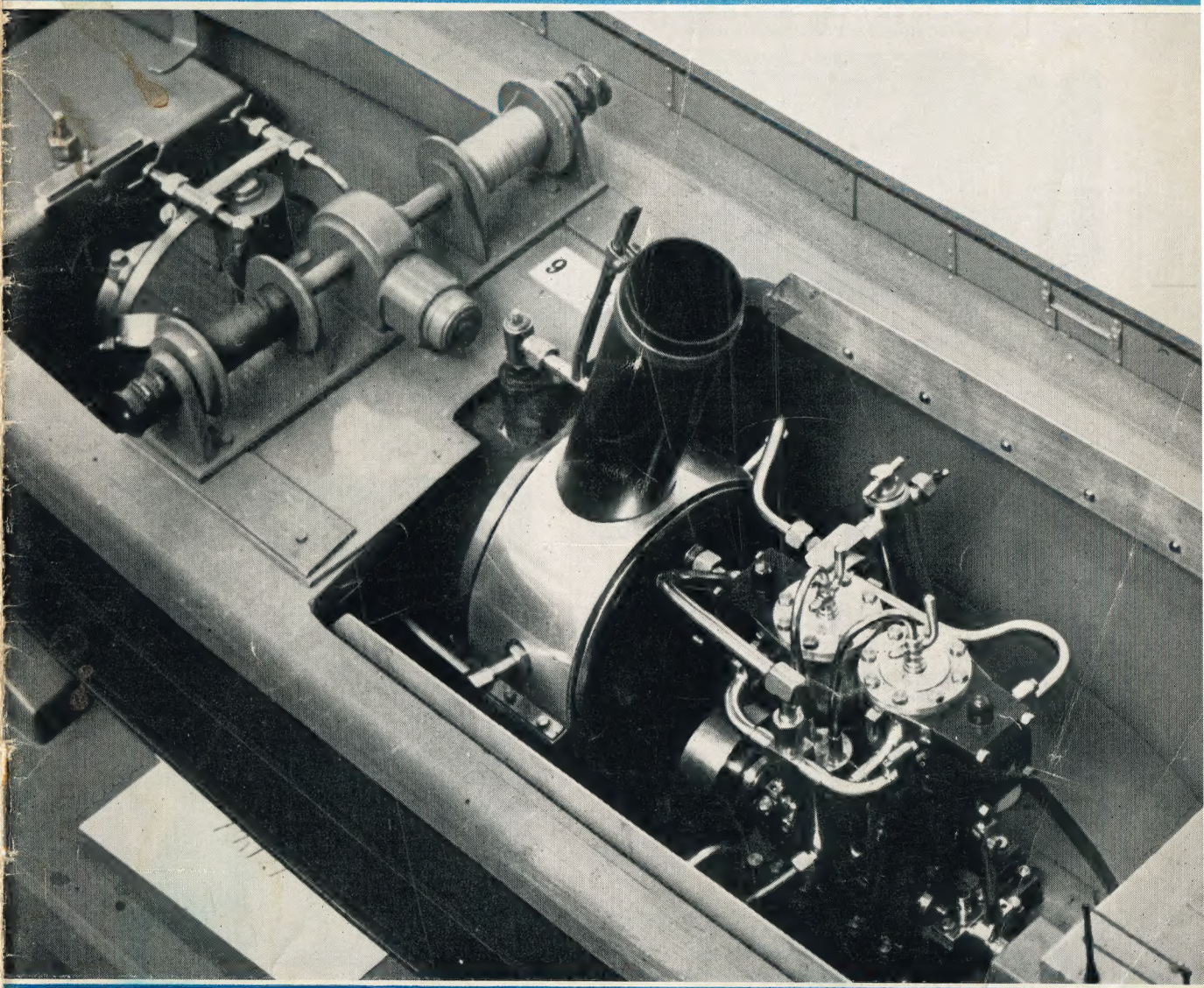
THE MODEL ENGINEER



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● A SIMPLE BEAM ENGINE BASED ON EARLY NINETEENTH CENTURY DESIGN ● IMPROVEMENTS TO A SWIVELLING SLIDE ● [FIRE-FIGHTING APPLIANCES IN MINIATURE ● READERS' LETTERS ● SCREW THREAD FINISHING AND RUNNING-OUT

OCTOBER 21st 1954
Vol. 111 No. 2787

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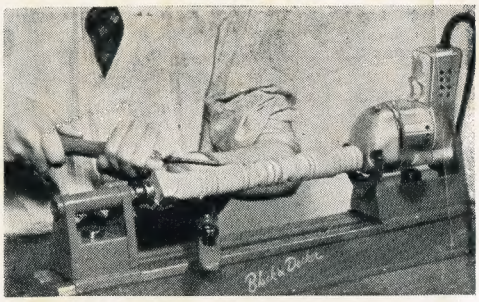

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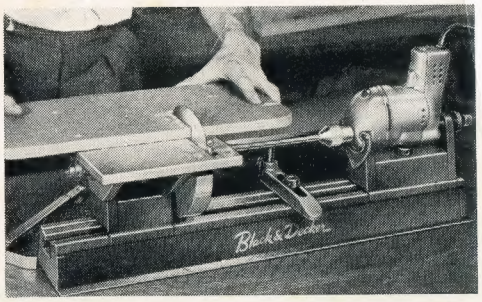

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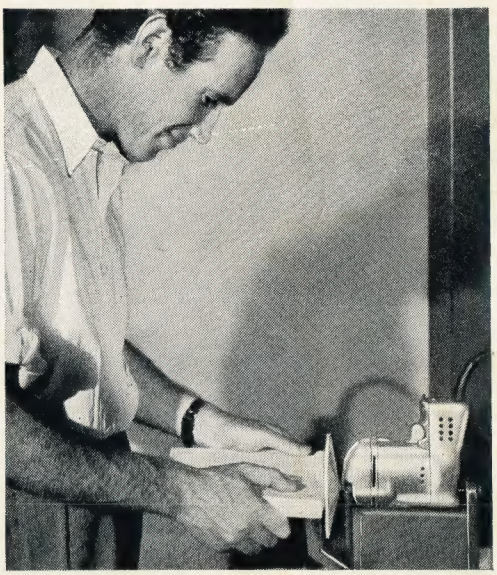

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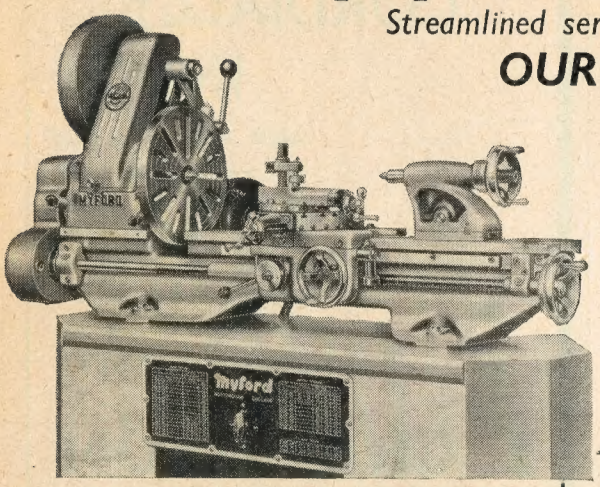

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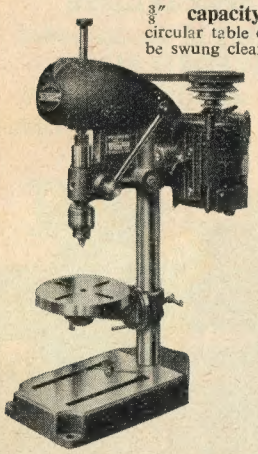

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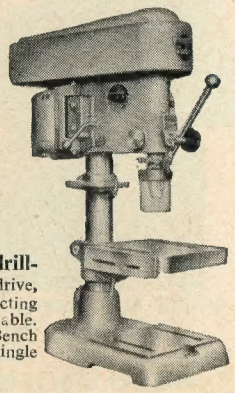

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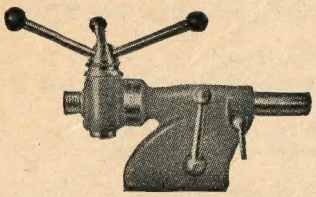

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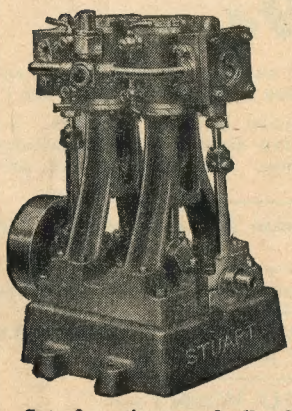

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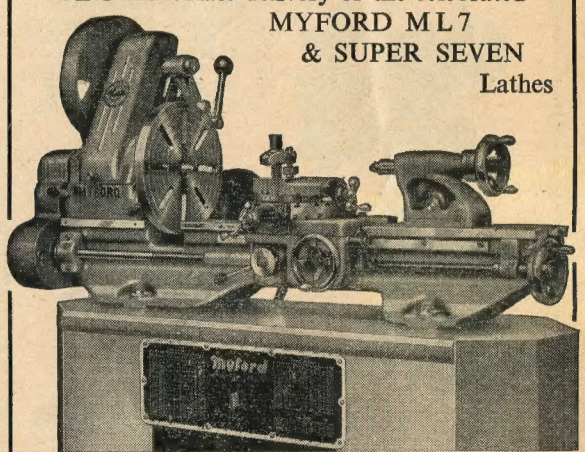

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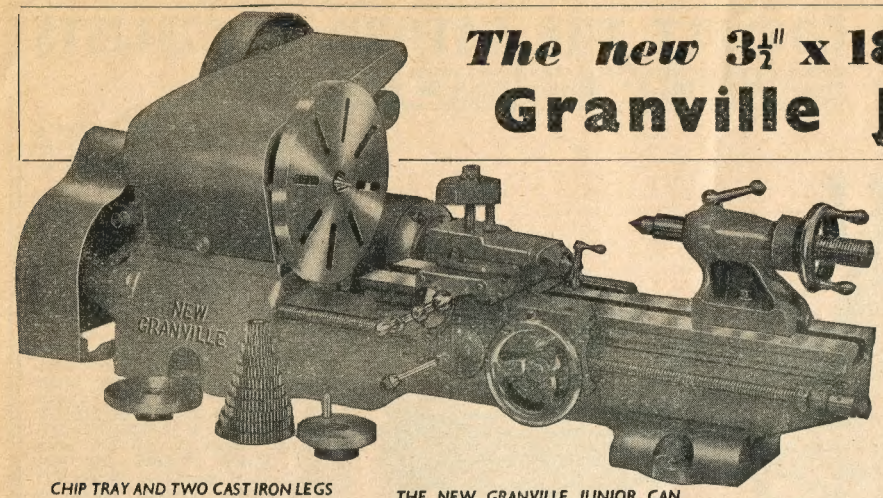

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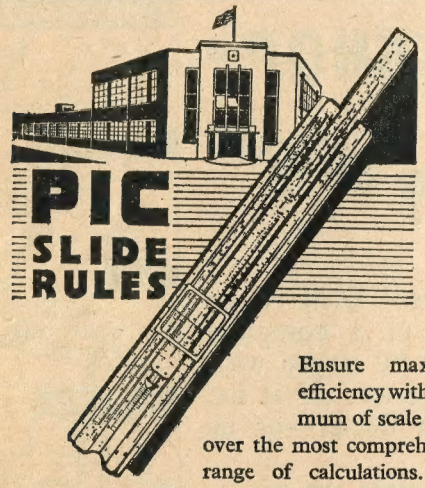

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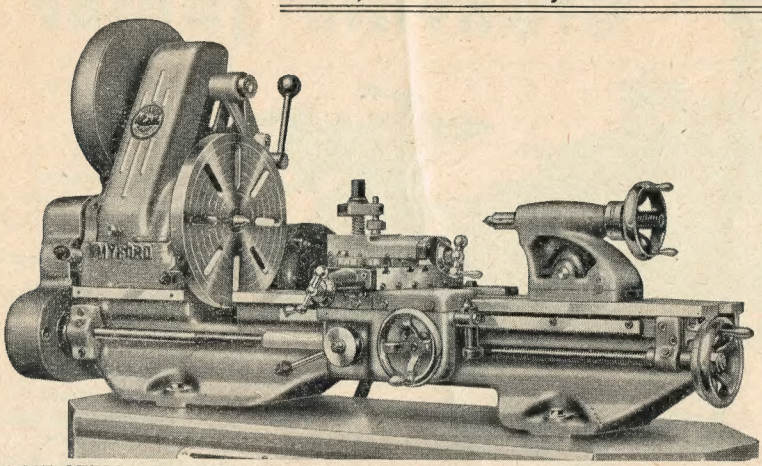

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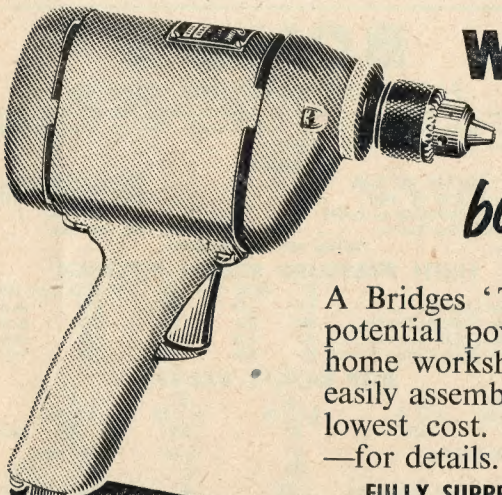

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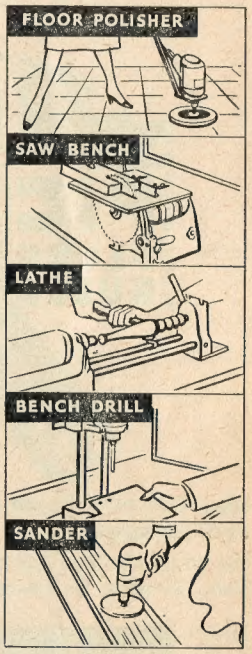

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THE
MODEL ENGINEER

EVERY THURSDAY
Volume 111 - No. 2787
OCTOBER 21st - 1954

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OUR COVER PICTURE

The subject of this week's photograph is a very fine steam power plant which was made and installed in his model trawler, *Wanderer*, by Mr. W. L. Jennings of Andover. This model was exhibited in the recent "M.E." Exhibition, where it received a good deal of very favourable comment. The engine is a Stuart "Double Ten" and is beautifully made. The boiler is of the centre-flue type and looked very smart with its wood lagging and neat fittings. The power plant, as a whole, is very well laid out and the installation is neat and orderly. The hull, which is built of wood on the bread and butter system, is nicely finished throughout. The edges of the layers are left square on the inside, which has much to recommend it in the case of a powered vessel, as it gives a number of flat surfaces on which to fix the power plant and the various accessories.

SMOKE RINGS

A Burrell Memorial

TO COMMEMORATE the fact that the town of Thetford, Norfolk, was once the home of the oldest engineering business in East Anglia, a decision has been made to erect a memorial plaque on a wall of the old works of Charles Burrell & Sons Ltd., in Minstergate Street. The committee in charge of this scheme has decided to make a general appeal for funds, to enable anybody interested in perpetuating the name of Burrell, or in steam road engines, to make a contribution.

The proposal is that the plaque shall be unveiled on the hundredth anniversary of the world's first heavy-duty steam road haulage engine. The plaque will depict the first Burrell-Boydell engine of 1856 above a suitable inscription, and the chosen site is a very good one ensuring that the memorial shall be seen by all visitors to the Abbey ruins.

Donations should be made payable to "Burrell Memorial Fund" and sent to Lt.-Col. S. E. Glendenning, 84, Rosary Road, Norwich.

The Old and the New

A VISITOR to the "M.E." Exhibition has expressed himself as being amazed at the number of models of old-time prototypes that he saw there, and he cannot understand why, as he puts it, "so many people waste their time and energies in producing such things when, all around us there are to be found hundreds of examples of modern engineering skill that would be far less difficult and much more profitable prototypes for the model engineer to spend his time on."

This particular visitor is not alone in his ideas which, after all, are very controversial; and these ideas are harboured by many people—perhaps, too many—who condemn, out-of-hand, any old-time prototype, just because it is "old-fashioned" and out-of-date. They talk slightingly of "old traditions that should be allowed to die," thereby revealing the inability to distinguish between "traditions" and "customs." Customs change, as and when required, to meet prevailing circumstances; traditions cannot die, but are handed on from generation to generation as a foundation on which to build up progress.

To the great majority of model engineers, our hobby consists in making miniature replicas of full-size prototypes, a process which, more often than not, involves considerable ingenuity applied to overcoming natural difficulties of design and construction, due to the reduction of mere size. These difficulties tickle the fancy of all of us, and are really the driving force which keeps our fraternity alive and active. The very fact that old-time prototypes tend to be more complicated in design, construction and arrangement adds to their attractiveness, while the fascination of watching them work is irresistible. And many of them, in miniature, embody modern ideas to ensure their success.

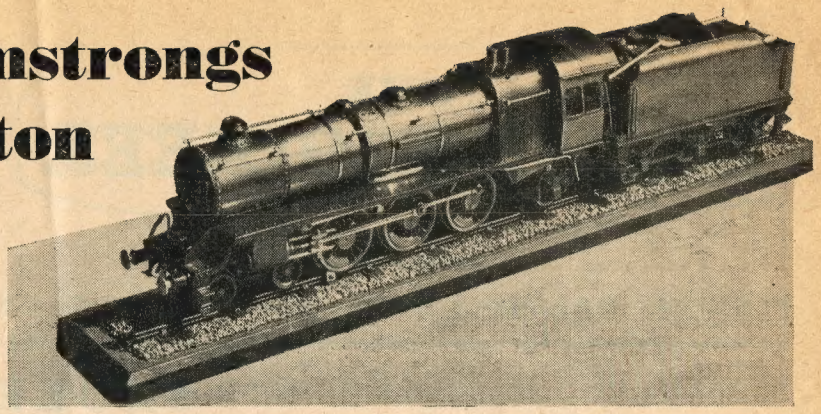
A Man Who Loves Locomotives

THERE MUST be hundreds of thousands of men to whom the above heading could apply, and in no two cases would the reasons be the same. But probably nobody has ever loved a locomotive more than did Norman McKillop love the Gresley "A3" Pacific No. 60100, *Spearmint*, of which he had charge for several years on the line between Newcastle, Edinburgh and Aberdeen. More than once in his writings has McKillop shown that he had a real affection for his engine; but if any proof of this were needed, it is to be found in a masterly article published in *Trains Annual* 1955.

The article deals with "Locomotive-men I have known," and at one point it refers to an occasion when "with a *very* important passenger sitting in the train behind us, we regained so much time without a hair being out of place that the official in the cab could not say just how it had been done. *Spearmint* knew all right, for I'll swear she gave me a wink when the official's back was turned."

That could come only from one who not only knows exactly what a steam locomotive really *is*, but also what she *means* to so many of us !

Vickers-Armstrongs South Marston Exhibition



Mr. Digby's No. 1 gauge coal-fired locomotive

Reported by Ian Bradley

THE Sports and Social Club of Vickers-Armstrongs Supermarine held their annual exhibition in the company's works at South Marston, near Swindon. In accordance with last year's arrangements, a section was devoted to model engineering activities, and competition entries were received from the various factories of Vickers-Armstrongs Supermarine.

This year the number and variety of the exhibits had improved and the standard of workmanship, in most instances, was much better. From the engineering point of view the highlight was undoubtedly the Beam Engine exhibited by Mr. G. Digby of Southampton. The contemplation of this partly finished model gave the judges a great deal of pleasure, for every part of this engine had either been cut from the solid or had been built up by very skilful brazing. It is to be hoped that the illustration of this model will serve to bring out the quality of the workmanship, particularly in relation to the gears which were actually filed up by hand.

Special note should be taken of the parallel motion for the valve-gear, and the column supporting the beam; the latter was built up from 14-gauge sheet steel and was an object lesson in the application of brazing to this form of construction.

Since the engine is, of course, only partly finished there are, naturally, some details that will require final attention. For instance, it was observed that the brazing securing the steam port to the cylinder proper showed a need for smoothing in order to produce a good fillet; doubtless this point will eventually be corrected.

In case there may be some readers who criticise the overlong studs that can be observed in this model it should perhaps be mentioned that in many old-time engines it was quite common practice to fit studs in this way, particularly on cylinder head covers. There are a pair of engines not far from the place where these comments are being written that demonstrate this practice most convincingly.

Mr. Digby's exhibit earned him the award offered for the best model in the exhibition in addition to first place in the particular class in which the engine was entered. It is not, perhaps, without significance that the second and third places in this class were also taken by Mr. Digby with a coal-fired No. 1 gauge locomotive, *Sir Roy Digby*, built to the instructions and designs of "L.B.S.C.", and a spirit-fired traction engine designed by someone unknown.

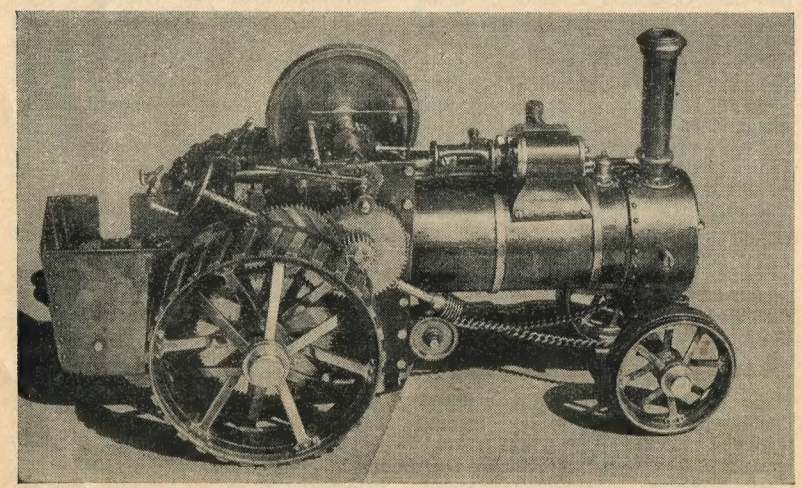
With regard to the locomotive, the finish was most unusual; for the whole of the boiler casing, running boards, cab and tender had been anodised. In all probability, this is rank heresy, but at least one of the judges found the finish very pleasing and practical for a small locomotive, and a great improvement on the atrocious paintwork often to be seen.

The watercraft on exhibition were more numerous than last year, and the finish of many of those in the competition classes showed marked improvement in workmanship. The winner was Mr. A. Washbourn of Southampton with his motor cruiser *Anne* powered by a water-cooled E.D. Special. The lines of this craft were excellent and showed that its builder has not been going around Southampton with his eyes shut.

The exhibitor had made all the fittings himself and there was quite a lot of ship chandlery in this model. Special mention must be made of the dinghy on chocks on the after deck. If the cruiser itself had not been in the competition, this dinghy alone would have been good enough to win an award.

The second-prize winner was Mr. G. Jones with his model of a 16-ft. open motor boat. This clinker-built craft was correctly copper-fastened and varnish-finished; all the deck fittings, such as bollards and fairleads, were to scale and the finish of these parts was in keeping with the class of boat to which they were fitted. Your reporter was particularly interested in this exhibit for it was an almost exact model of a 16-ft. open boat once owned by him; alas, the full-size craft is now somewhere on the bottom of the river Blackwater in Essex.

The excellent finish of this exhibit was not confined to those parts that could be seen. On removing the seats and taking up the floor boards, the boat building was found to have been carried out correctly in all respects. But why, oh why, that incongruous gland nut for the stern tube. Surely, something



A spirit-fired traction engine by Mr. Digby

better than a petrol pipe union nut could have been found for this purpose? Your reporter's full-size boat, fitted with a reversing propeller, had a simple gland *inboard*. This gland was of the flange type adjustable by means of nuts running on studs set at 180 deg. Mr. Jones' exhibit would do well in any exhibition, but *not* with the present stern tube arrangements.

The section devoted to exhibits of tools and workshop equipment did not attract a strong entry. It seems to be the impression at most exhibitions that, where tools are concerned, mediocre finish is good enough to pass the judges; on the assumption, presumably, that as tools are severely functional articles there is no need to impart a good finish to them. Sometimes, too, the mechanical fitting does not receive the attention it warrants. In these respects, the tool exhibits were no better and no worse than many seen at other and larger exhibitions. It is to be hoped that, in future, the tools entered for competition will be more numerous and of a higher quality.

Amongst the examples of handicraft in the exhibition, Mr. E. G. Cooke showed some outstanding work consisting of a brass coal holder, hot-water jug and chestnut roaster. These articles were fine examples of the coppersmith's work and were splendidly finished. Only an expert could have produced them. As a contrast in work, Spanish figurines were shown by L. Caselles of Southampton, and an excellent fire screen in gros point tapestry by G. Giles of Swindon.

The static models in the exhibition were aircraft, for the most part and, as might be expected, many of them represented products of Vickers-Armstrongs. The class winner was Mr. C. H. Douglas with a model of the prototype Swift F4. This exhibit was well finished and, also, well mounted so that it gave a really convincing impression of the aircraft in flight. It is not often that solid models manage to convey this impression, but when they do so it is a refreshing experience.

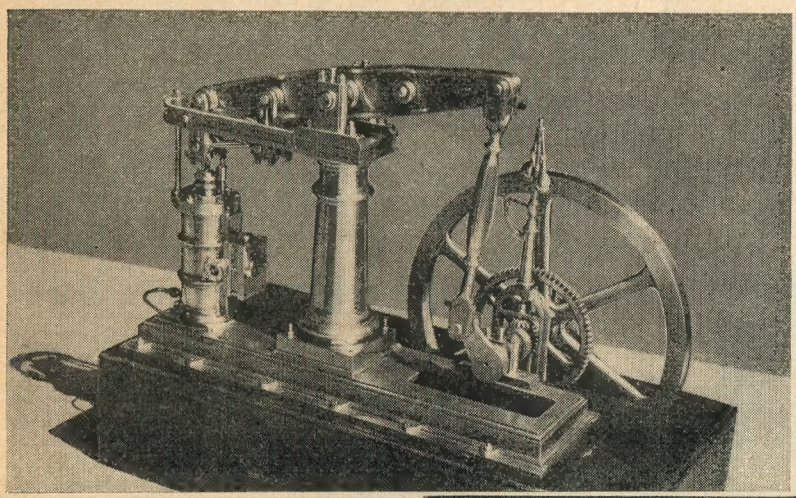
The models in the loan section were numerous and included Mr. G. A. Froud's miniature set of steam thrashing tackle. This model, or rather the engine that drives the thrashing machine, has been seen at the "Model Engineer" Exhibition, where it was a prize-winner and attracted considerable attention. The thrashing machine itself, however, was new to your reporter. The use of all metal construction, in order to convey the correct thickness of the woodwork forming the body of the machine, has everything to recommend it and certainly results in a model of most pleasing appearance. Apart from this point, the machine was complete in every way, having drum, shakers, conveyor, bagging shutes, blower and even a cupboard for spares that were enclosed within. Some difficulty must have been experienced with the belting for so small a model; nevertheless, those belts fitted gave a very good simulation of the rubber-canvas or balata belting usually found on a full-size thrashing machine.

Mr. Pledger of Weybridge showed the part-finished chassis for a 5-in. gauge tank locomotive, whilst Mr. Hilliard had on exhibition the radio-controlled model of a standard R.A.F. launch as well as a nicely finished cabin cruiser. Perhaps the finest aircraft in the show was Mr. J. Baker's 1/5 scale model of an Aeronca Sedan fitted with a flat-twin engine. This installation was well carried out and faithfully simulated the special engine originally made for the full-size aircraft by Messrs. J. A. Prestwich & Co. of Tottenham. This exhibit, as a whole, was a fine example of a really large model.

Mention must be made of the portable track from Vickers-Armstrongs' works at Weybridge. As usual, the drivers were kept busy all the afternoon with their 5-in. gauge "Ajax" locomotive giving rides to the younger visitors to the exhibition. Perhaps, some of those carried will turn out to be the budding engineers of the future.

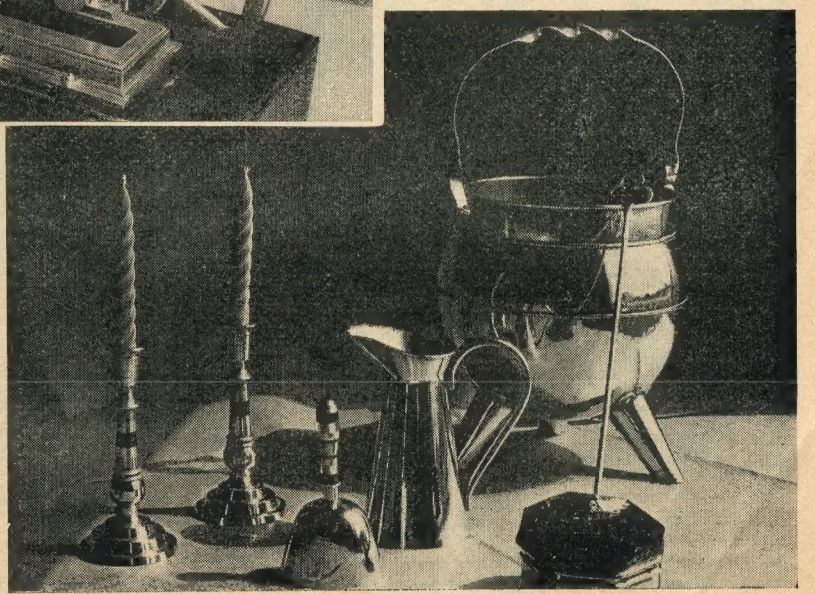
To sum up: the quality at this year's South Marston exhibition showed improvement. The finish of the exhibits was generally better than last year and the paintwork, in the main, was more carefully carried out. The lack of tools or workshop equipment on exhibition was a rather disappointing feature, but the establishment of a properly equipped workshop for the local model engineering society may do something to remedy this before next year's show.

Finally, our thanks are due to Messrs. Vickers-Armstrongs for kindly providing the photographs that illustrate this report.



Left: A partly-finished beam engine in which all the parts were either built up or machined from the solid

Below: Among the examples of handicraft, were Mr. E. G. Cooke's coal holder, hot water jug and chestnut roaster



Talking about Steam —

No. 28.—MORE ABOUT FOWLER ROAD LOCOMOTIVES

By W. J. HUGHES

IN correspondence—and in conversation, too—I have been asked what I have against the Burrell engines, because in both my book and my articles I have not dealt with Burrell's at all. The answer is quite simply that I'm not *agin* 'em at all; it's just that I haven't got around to 'em yet ! So the Burrell fans can rest assured that their favourites will be dealt with in due course.

Meantime, here are some more pictures of *Excelsior*, commencing with one showing the off side of the belly-tank and other useful detail for the modeller. The tank itself has a flanged top and bottom, to which the sides are riveted; the bottom of the tank has the flange pointing downwards, so to speak.

There is a manhole on the off side of the tank, and a smaller one on the bottom at the near side, which may perhaps show in the next photograph (or may be lost in reproduction).

On top of the tank may be seen the filler, and the water-lifter, which takes steam from the cylinder-block, via a wheel-valve. The hose-pipe from the water-supply is attached to the upper union, and in this case (but not in every one) there is a lower union to which another hose may be attached. This is to allow the lifter to be used in filling a mobile water-tank, and was a feature often seen on " ex-army " locomotives.

The steerage shaft passes through a " tunnel " in the tank, the rivets of which may be seen, and the steerage drum is carried in brackets bolted to the tank-bottom, seen in Photograph No. 2. One of the brackets, and a close-up of the worm-wheel, are in the next picture.

Returning to Photograph No. 1, further useful detail includes the manhole on the side of the boiler—note the surrounding brass edging riveted to the cleading—and the boiler check-valve through which the water-pump delivers. The fine copper pipe which appears from below the motion-cover and curves down in front of the horn-plate is to drain the tray under the motion-work.

On the next photograph (No. 2), the ashpan details are seen, and the angles which are riveted to the front of the tank to enable the latter to be suspended from the boiler. Note also the lapped riveted joint in the centre front of the tank.

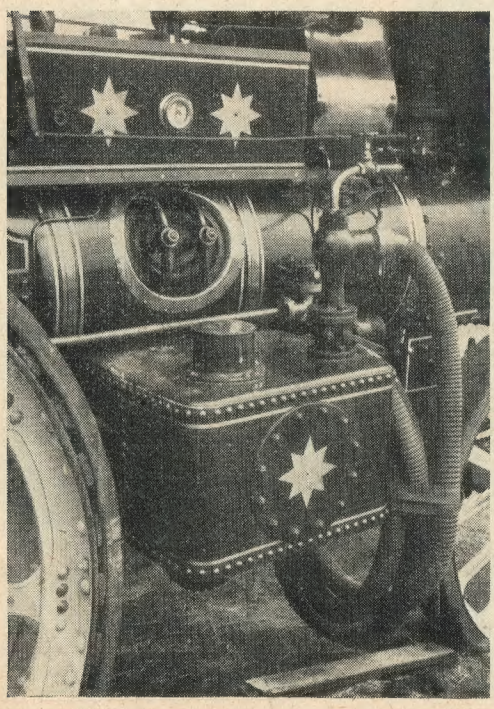
Footplate Details

Starting at the left of Photograph No. 4, the hand-wheel behind the flywheel is the control for the flywheel brake, and immediately above it are the levers of the fast and extra-fast speeds. The knob between them is that for the by-pass or simpling-valve, and the reversing-lever and two-handed regulator-lever are easily distinguished.

The other knob is the drain-cock control, with the slow-speed lever below. Lower down is the water-pump, with the bracket for the steerage shaft bolted to it. The pump is bolted to the horn-plate and stayed to the front-plate; the valve-box is bolted to the end of the pump, the delivery-pipe curving under the steerage-bracket and over the top of the gear-case, and the by-pass pipe descends vertically to the tank.

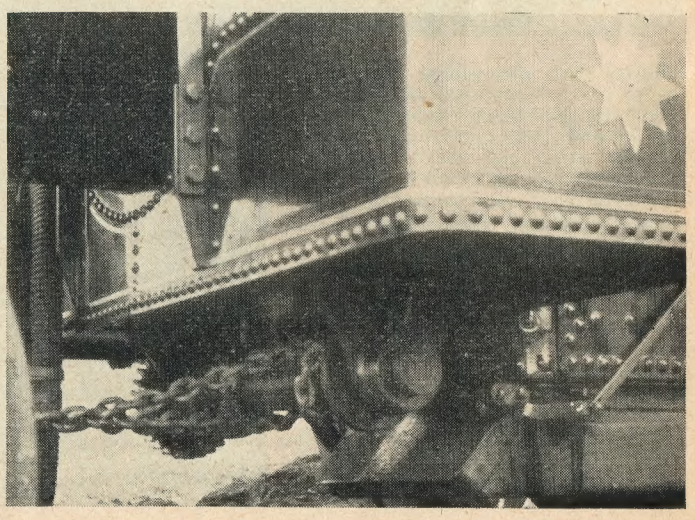
Right in the foreground are the tool-box and the brake hand-wheel, with the handle for the injector water-cock immediately below the wheel.

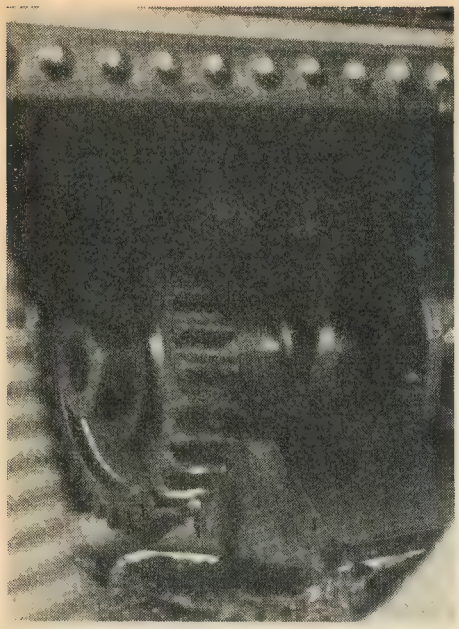
In the picture of the foot-plate itself, the pipe in the top left-hand corner is to take steam from the turret to the injector. The third shaft is seen, with

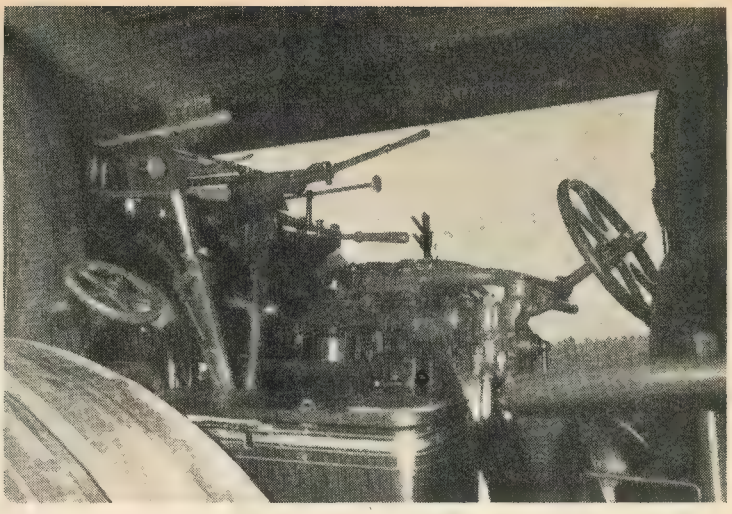


Left—Photograph No. 1 : Offside details of Fowler No. 14862 " Excelsior," owned by W. D. Miller

Below—Photograph No. 2. : Steering drum, ash-pan, and belly-tank, note flange turned downwards in tank-bottom







Photograph No. 4 : Controls and other details of the Fowler footplate

Left—Photograph No. 3 : Worm, worm-wheel, and bracket of steerage

one of the girder-type links which connect it to the hind-axle and the compensated springing system (as described earlier in this series). This link, however, and the horncheek in which it slides, differ somewhat in appearance from the former illustrations, but the principle is the same.

Between the shaft and the fire-door is the bottom fitting of one of the water-gauges, and you will note the chain attached to the latch of the door so that the latter can be opened easily. In the foreground is the duck-board on which the driver stands, and an oil-bottle, which in model form is just the sort of thing which makes for realism.

Slow-speed Gearing

Photograph No. 6 shows well the slow-speed gearing, which on later engines was cased in. The crank-shaft and second-shaft bearings are supported in a massive steel casting bolted to the hornplate, and a bridge over the top of the former carries the lever and fork of the change-speed mechanism. Also incorporated in the bridge is the oil-box for the crankshaft bearing.

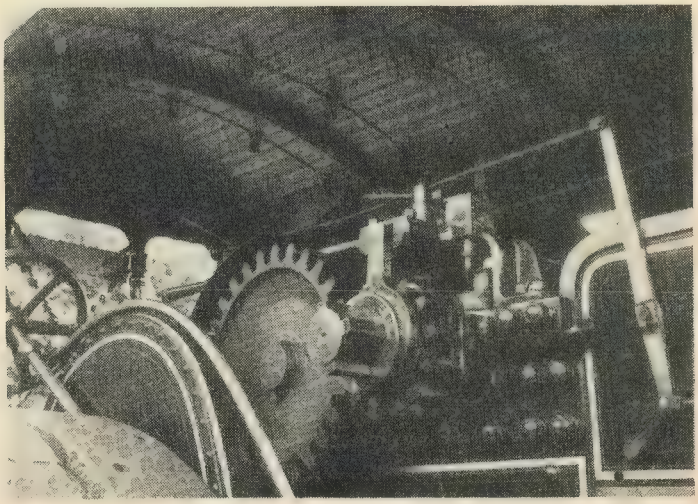
The characteristic drain-cock knob and lever of the Fowler compounds is seen, and on the left the water-delivery pipe curves over the top of the gear-case, as previously mentioned.

Moving further back on the off side, the next photograph gives a good view of the " form-fitting " steersman's seat, and of the coal-bunker to which its bracket is bolted. Lower down are the hand-rail and footsteps for giving easy access to the footplate. The upper one of these, as seen in Photograph No. 8, extends inside the tender to form a separate footplate for the steersman.

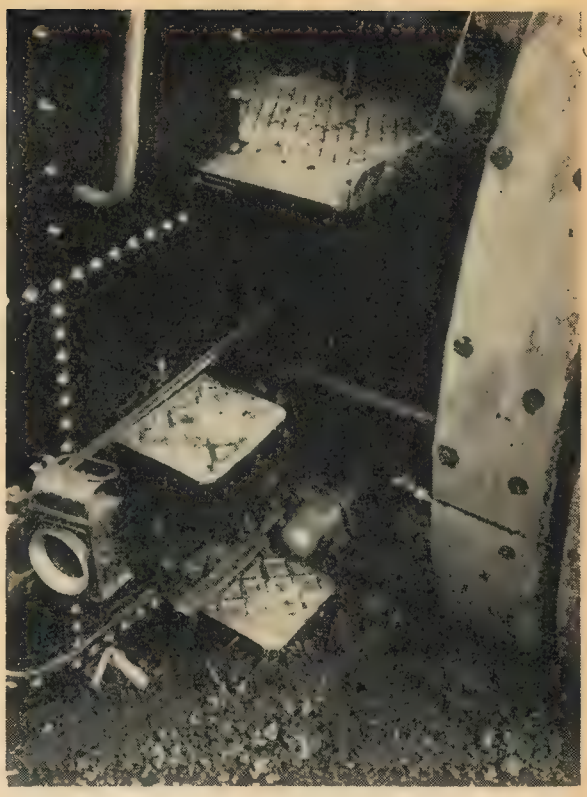
Also in this photograph, note how

Left—Photograph No. 5 : More footplate details, as seen from the steersman's seat

Below—Photograph No. 6 : The slow-speed gearing and bearing bracket

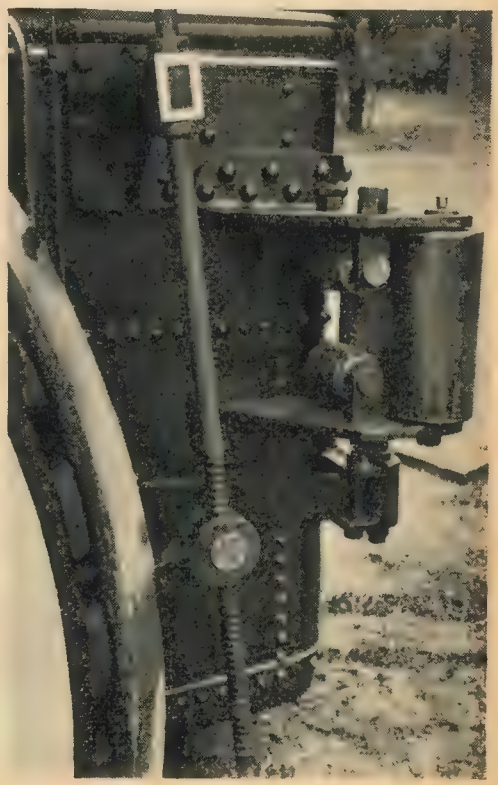


Photograph No. 7 : Coal-bunker, steersman's seat, and footsteps

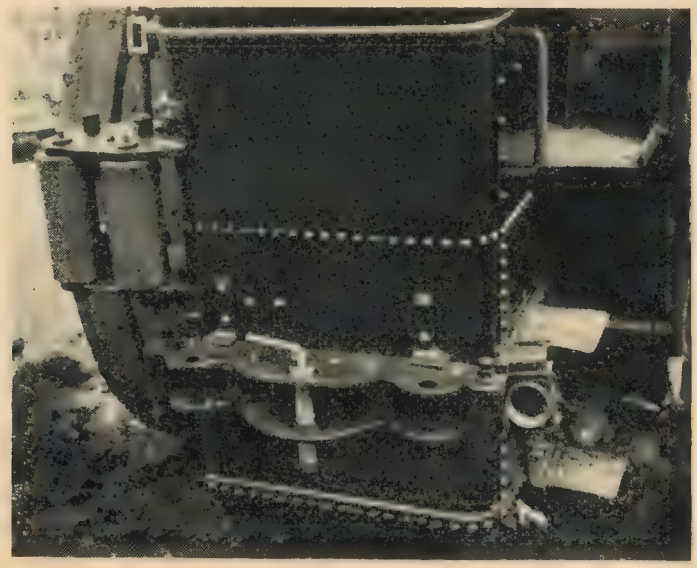


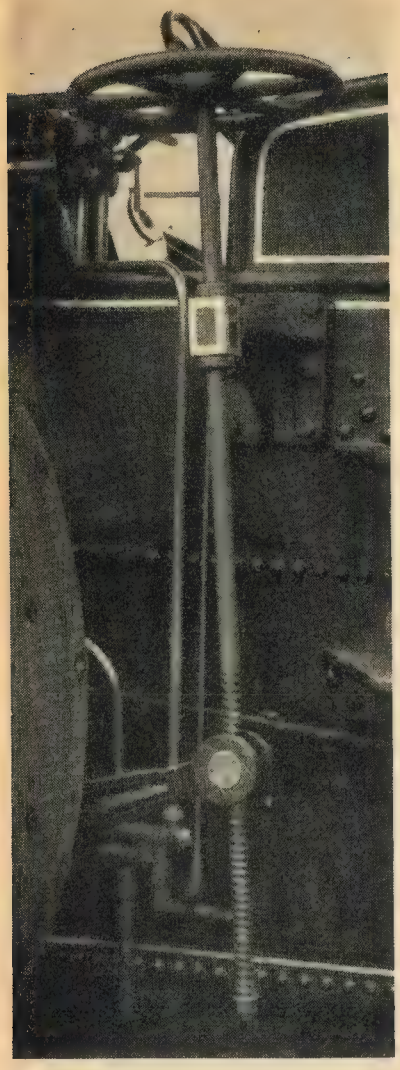
Photograph No. 8 : Tail-lamp, foot-steps, expansion-joint, and brake-shaft bracket

Right—Photograph No. 10 : Brake-screw, bracket, and fair-lead. Note clip at top for water-cock control-rod



Below—Photograph No. 9 : Draw-bar—note taper-cotters at ends—and fair-lead for winding-rope





Photograph No. 11 : This picture shows the hand-brake and injector

the manhole of the tender-tank is extended downwards and outwards to form a bracket to which the lowest footstep is attached. In front of this is the expansion joint and shut-off valve in the compensating-pipe, which connects belly-tank to tender-tank. (In my drawing, T.E.5, the expansion-joint is further forward, but *Excelsior* is a later engine.) The small cock just below the tail-lamp is, of course, to allow the tank to be drained.

More Tender Details

Coming round the corner in Photograph No. 9, we see the drawbar, which is directly attached at the ends to the stout straps which run along the tender-sides to take the towing-strain direct to the hornplates. Round-taper cotters are fitted to ensure that the drawbar is properly adjusted to the tender-back, but no strain falls on the tender itself.

To the left, and in the next photograph, may be seen the fairlead which enables the winding-rope to be used at an angle. The bearer-plates are flanged and riveted to the tender, and there are two small horizontal rollers fitted to prevent the rope being chafed on the plates. And, talking of wire-rope, by the way, don't forget if you are modelling a Big Lion (or any other engine, for that matter !) Brer Reeves has a supply of the necessary, in 1½-in. scale.

The brake-screw is fitted in a strong cast bracket bolted to the tender-side, and, of course, it has a square thread, This is a feature which most modellers seem to balk at in a small size, but with the aid of a travelling steady it is not too difficult a job. Yet what a difference it makes in the appearance !

As for cutting the square-threaded nut, this can be done with a tap made at the same time as the screw. If the latter is made about an inch-and-a-half longer than necessary, the surplus can be tapered, and cut off. Then if it is fluted and case-hardened, it will cut the internal thread in a bronze nut in the usual way.

A Slight Difference

By the way, notice the construction of the tender itself, differing from the road locomotive shown in Drawing No. T.E.5, but like that shown in No. T.E. 5(A). The bottom of the tank and the back of the tender are flanged, with flat side-plates riveted on, whereas in the first-named drawing it is the sides which are flanged. However, in *Excelsior's* coal-rack—the upward extension of the bunker—the sides *are* flanged, with the backplate riveted on.

Photograph No. 11 shows the injector, with the water-delivery curving forward behind the hind-wheel, the steam-pipe coming down from the turret over the tender-side (as mentioned earlier), and the water-cock worked by the rod of which the handle was seen in Photograph No. 4. The elbow from the tank itself is hidden by the brake-screw, of course.

For the BOOKSHELF

Television Simply Explained. By R. W. Hallows. (Second Edition.) (London: Chapman & Hall Ltd.) 196 pages, 7¼ in. × 4¾ in., illustrated by 97 line drawings and 16 half-tone plates. Price 10s. 6d.

This book gives a simple and lucid explanation of the methods and apparatus employed in television reception and transmission, avoiding the use of mathematics and technical jargon, and using simple analogies to explain principles. The present edition has been revised and several new illustrations added; it should be both interesting and instructive to all who wish to have a reasonable understanding of one of the most popular scientific developments of the age.

The Repair of the Small Electric Motor. By Karl Wilkinson. (London: E. & F. Spon Ltd.) 180 pages, 9 in. by 5⅞ in., 98 line drawings, 3 half-tone plates, 21 pages of wiring diagrams. Price 20s.

It has been said that the repair of machinery has become a lost art, and it is certainly true that under modern industrial conditions, complete renewal may often be found cheaper than repair. But actual cost may be less important than keeping existing machinery in operation, and where there is a likelihood of delay in obtaining new machines or spares, repair is not only economically advantageous, but sometimes absolutely essential. Many readers of this journal have been faced with repair problems, either in an amateur or professional capacity, and the small electric motor is one of the common objects for such attention, on which little practical information has hitherto been available. Mr. Wilkinson's book will, therefore, fill a long-felt want, dealing as it does with all types of motors in general use, in a thoroughly practical and comprehensive way.

The popular split-phase a.c. induction motor, as extensively used as a source of power for lathes and other machines in many home workshops, is quite rightly given a considerable amount of attention, including essential parts such as the automatic switch; also repulsion-induction types, 3-phase motors, universal and d.c. types. A chapter is devoted to mechanical details such as fitting bearings, assembly and testing, and another to small electric powered tools. The many wiring diagrams for various types of motors and control gear will solve many problems of connecting up. Altogether, the book can be highly commended to anyone with a practical interest in electric motors.

George Stephenson. By John Rowland. (London: Odhams Press Ltd.) 240 pages, 5½ in. by 8½ in. Illustrated. Price 15s. net.

Books about the life and work of George Stephenson, creator of Britain's Railways, are fairly numerous; most of those which were written in the "popular" style were often romanticised to the point of absurdity and were by no means free of error. This new book, however, is of quite a different nature; although it has been written with the obvious intention of being understood and appreciated by a large, non-technical public, it has clearly involved a great deal of careful research by its author, who has taken the greatest pains to make his story authentic, factual and interesting. George Stephenson is depicted as a man of keen intelligence, energy and drive, rather than as an outstanding genius. The few references to his private life are restrained and far from being sentimentalised; the descriptions of his various achievements never overstep the limits of truth and credulity. The result is a very pleasing record of one of the giants of railway history, and certainly the greatest pioneer of railway development. It is a book to be read and enjoyed by all who would seek the truth about the life, disappointments, triumphs and achievements of a very great man.

Screw Thread Finishing and Running-out

By "Duplex"

THREAD finishes of both internal and external screw threads are here taken to denote the form given to the end of the thread, either where it first engages or at the point where it terminates; this usually consists in chamfer-

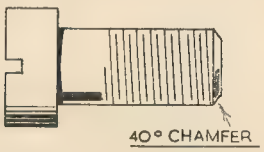


Fig. 1. A screw thread finished by chamfering

ing the end of the thread or undercutting it down to the core diameter for an appropriate distance.

The cheese-headed screw shown in Fig. 1 has its end finished by chamfering to the customary angle of 40 deg.; this removes the burrs left after the threading operation and enables the screw to be more readily engaged in a threaded counterpart. A useful tool for this operation is illustrated in Fig. 2, and with it mounted in the back toolpost the end of a screw can be faced, reduced in diameter and chamfered, as represented in Fig. 3.

These dog-end screws are mainly used for locating parts, by means of a dowel hole in which the tip of the screw engages, but screws of this form can be easily started by feel alone in awkward places, particularly when the

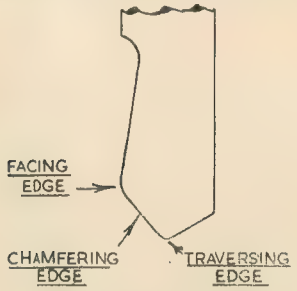


Fig. 2. A three-purpose tool for the rear toolpost

first two of three threads in the mating part are removed by counter-drilling to the clearing size.

As shown in Fig. 4, small grub-screws, for example those fitted for sealing oil ducts, should be dealt with in the same way so as to ensure easy replacement.

When a thread is cut with a die up to the under side of a screw head, it is not unusual to find that, as represented in Fig. 5, burrs are left at the end of the thread, and these may stand above the surface of the shank and keep the screw from going fully home in a clearing-size hole or even in a washer. The amount of this burring depends largely on the depth of the coned throat formed in the die, and it is particularly marked when the die is reversed in an attempt to form the thread right up to a shoulder.

To allow a screw to enter a threaded hole right up to the head, it is usually sufficient to drill out the first few threads of the internal hole to the clearing size, and this is preferable to overdoing an undercutting operation on the screw itself.

However, a work-piece may be weakened and spoilt by counter-drilling to too

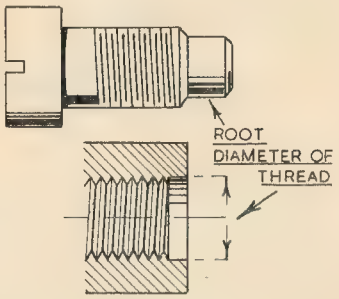


Fig. 3. A thread finished to give easy engagement

great a depth, but a damaged screw is easily replaced. When counter-drilling the work in this way, the tapping-size hole should be opened out before the thread is cut; otherwise, the counterbore will probably be formed eccentrically and the screw may bind as it is forced home.

Undercutting a screw with a parting tool to form a run-out for the thread, as shown in Fig. 6, is inadvisable as the sharp shoulders formed greatly weaken the screw at these points, and there is no shoulder left to centre a washer correctly. A tool with a rounded point is sometimes used for this work, but the form of tool illustrated at the foot of Fig. 6 is more commonly employed, as the 45 deg. chamfer angle gives a better finish to the end of the thread. With either of these tools, a small register is left for centring the washer.

The undercutting should be carried only as far as the core diameter of the thread. Advance the tool until it just rubs against the thread, and set the cross-slide index collar to zero; the amount of infeed then needed, when undercutting a Whitworth thread to the core diameter, is equal to the figure 0.64 divided by the value of the pitch. For example, the screw is 20 t.p.i. and so has a pitch of 1/20 in., and by dividing this into 0.64 the depth of the thread is shown to be 32-thou. in. The width of the undercut should be about twice the pitch of the thread, so in the example given it would amount to some 1/10 in.

When grinding a tool for undercutting screw threads, it is advisable to keep the tip radius small, so that the tool can be used on screws of various sizes; the width of the undercut can

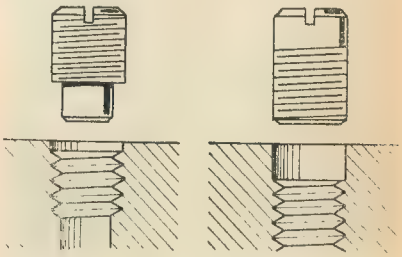


Fig. 4. Thread finished for grub-screws

then be increased, where necessary, by traversing the tool along the work.

Finishes and Run-outs for Machined Threads

When screwcutting a part such as a machine feedscrew with either a square or a V thread, it is advisable first to reduce the end of the work for a short distance to the core diameter; this not only enables the spindle to be started more easily in its nut, but the machined portion also affords a guide for finishng the thread to the correct depth. As shown in Fig. 7, it used to be the practice to drill a radial hole in the work to mark the termination of the thread, but this usually involved pulling the lathe belt by hand to cut the last part of the thread, for an over-run would probably break the point of the tool.

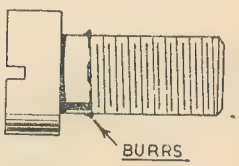


Fig. 5. Burrs left on a die-cut thread

The tapered run-out illustrated in Fig. 8 is formed by withdrawing the tool when nearing the end of the thread, but here again there is a danger of damaging the tool, and practice is needed to obtain satisfactory results where the work is rotated at any but the slowest speeds. A valuable feature

(*Continued on page* 479)

Model Power Boat News

BY MERIDIAN

THE WEST LONDON, KINGSMERE AND BLACKHEATH REGATTAS

THE Round Pond, Kensington, is perhaps one of the best known model boating lakes in London, but its large area presents a problem for regatta organisation. Stopping is particularly difficult, as the depth of water increases quite rapidly from the bankside, and boats often go for an involuntary trip to the other side of the pond, if they steer a course just out of the stopper's reach.

The West London M.P.B.C. are not deterred by the difficulties, however, and manage to stage an annual regatta. This year's event proved very successful, with a good attendance of straight-running boats of various types from most of the clubs in the London area. Welling and Forest Gate were well represented, and both of these clubs did well, as the results show.

On this occasion, the famous " Round the Pond " marathon was not on the programme, but a team nomination event was held instead.

Nomination Race
80 *yd.*

(1) W. C. Cole (Forest Gate), *FG* 14; error 0.4 sec.

(2) P. Lambert (St. Albans), *SA* 15: error 1.4 sec.

Steering Competition

(1) J. Slender (Welling), *Sarah Ann*: 11 points.

(2) J. King (Welling), *Jean*: 9 points.

(3) A. Clarke (Forest Gate), *Vivienne*: 7 points.

Mr. J. Skingley, Junr. (Victoria) with the four-cylinder motor launch " Josephine "

Team Nomination Race

(1) Victoria Club.

Kingsmere Regatta

It is pleasant to report that the Kingsmere club have held a regatta on Wimbledon Common once more, after a ban lasting two years. On this occasion, permission was forthcoming to run on the Rushmere pond for the regatta, and it is hoped that the pond will be available for straight-running boats at other times.

Owing to the noise problem existing in this area, there were no speed events, but some novel ideas were forthcoming to supplement the ordinary Nomination and Steering contests. The Nomination course was remarkable, inasmuch as it was triangular, and boats had to be diverted at two points before returning to the owner. This made for much excitement when boats went " off course," and the nominations were rather a gamble, as the course distance was an unknown quantity. The winner of this event was R. Curwen (Bromley) with *Vanessa*. The error was only 2.4 per cent.—a very close estimation in view of the circumstances.

The other novelty event was a team steering contest. Each team consisted of two boats, which were paired by a draw, and the boats made two runs each, so that the " possible " was 20 points. The draw certainly produced some odd pairs, but all teams tried their hardest to put up a good score.

Steam *v.* Internal combustion—Messrs. F. Holme and W. Cole—preparing to run in the steering competition

Mr. R. Phillips (S. London) starting his "C" class boat "Foz 2"

Mr. S. Stevens (Bromley) with his very workmanlike motor cabin cruiser

A Radio Control event was also on the programme, and was contested by some eight entries.

Results

Triangular Course Nomination

(1) R. Curwen (Bromley), *Vanessa*: 2.4 per cent. error.
(2) LaRoche (Welling), *WG8*: 3.3 per cent. error.
(3) A. Squire (Kingsmere), *Comet III*: 3.5 per cent. error.

Steering Competition

(1) W. Everitt (Victoria), *Menace*: 13 points.
(2) A. Squire (Kingsmere), *Comet III*: 11 points.
(3) J. Slender (Welling), *Sarah Ann*: 10 points.

Radio Control

(1) S. Stevens (Bromley), *BY7*.
(2) R. Curwen (Bromley), *Vanessa*.

"*Pairs*" *Steering Contest*

(1) A. Squire (Kingsmere), *Comet III*, and Cousins (Welling), *Kentish Maid*: 16 points.
(2) F. Curtis (Kingsmere), *Korongo*, and J. King (Welling), *Pekoe*: 12 + 11 points.
(3) J. Slender (Welling), *Sarah Ann*, and W. Townsend (Victoria), *Jean*: 12 + 9 points.

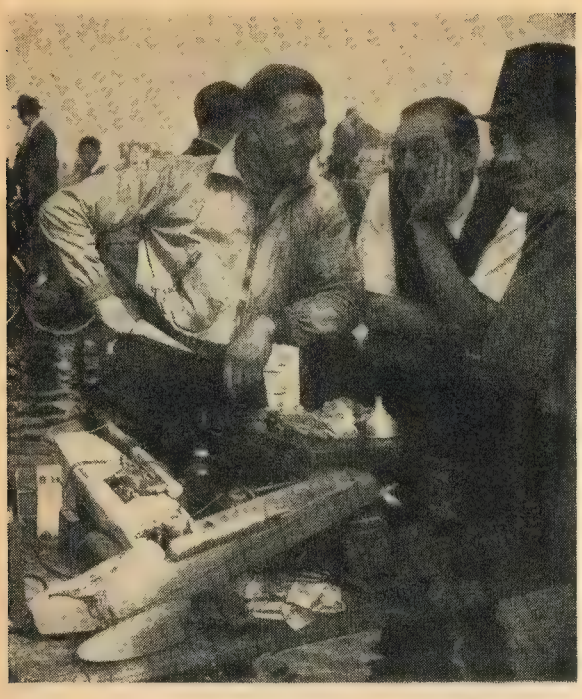
Blackheath Regatta

This was the last regatta of the season, with a full programme of speed and straight events, and a sunny day, combined with a good attendance of competitors, helped to make a pleasant day's sport. The speed boat men took advantage of the conditions to put up some good runs, and in the Class "B" race, G. Lines established a new record for 500 yards at a speed of 62.36 m.p.h. with *Sparky* 2. This is the first time this season that Mr. Lines has run this boat, as it had been retired while experiments proceeded with the "twin float" hydroplane *Genevieve*.

High speeds were also achieved in the other hydroplane events, and the Class "A" race, in particular, was very exciting, with the first three place winners returning times very close to each other.

Some spectacular aerobatics were

Mr. J. Slender (Welling) starting his steam launch "Sarah Ann", recently re-fitted after burning out its water-tube boiler at a previous regatta



A pond-side discussion between Messrs. Everitt, Woodley and Innocent

An interesting boat entered in the Class "B" race was *Tha III* by B. Stalham (Kings Lynn). This boat gives an impression of great power but suffers from "regatta shyness"—a trouble not unknown to speed boat exponents!

The straight events were well supported and were run off very smoothly. The Blackheath steering course, however, proved difficult, and the maximum score was 8 points attained by three competitors. The run-off resulted in a win for A. Clay, of the home club.

50 yd. Nomination Race

(1) B. Cousins (Welling), *Kentish Maid*: 0.27 per cent. error.
(2) S. Dearling (Blackheath) *Maj*: 2.00 per cent. error.
(3) A. Rayman (Blackheath), *Yvette*: 2.27 per cent. error.

500 yd. "C" Restricted Race

(1) K. Hyder (St. Albans), *Slipper* 4: 60.88 m.p.h.
(2) W. Everitt (Victoria), *Nan* 3: 55.8 m.p.h.
(3) C. Hancox (S. London), *Lady Joan*: 53.3 m.p.h.

500 yd. Class "C" Race

(1) R. Phillips (S. London), *Foz* 2: 52.5 m.p.h.
(2) B. Miles (S. London), *Dragonfly* 4: 50.6 m.p.h.

Steering Competition

(1) A. Clay (Blackheath), *Elizabeth*: 8 + 5 points.
(2) W. Everitt (Victoria), *Menace*: 8 + 3 points.
(3) E. Vanner (Victoria), *Leda III*: 8 + 0 points.

500 yd. Class "B" Race

(1) G. Lines (Orpington), *Sparky* 2: 62.36 m.p.h.
(2) M. de B. Daly (Blackheath), *Nipper* 2: 57.2 m.p.h.
(3) J. Chapman (Kings Lynn): 40.1 m.p.h.

500 yd. Class "A" Race

(1) J. Benson (Blackheath), *Orthon*: 60.88 m.p.h.
(2) G. Lines (Orpington), *Big Sparky*: 57.5 m.p.h.
(3) J. Innocent (Victoria), *Betty*: 57.1 m.p.h.

This report marks the conclusion of another very successful model power boat season, in which activity has been greater than ever in both prototype and racing classes, and steady progress made in hull and power plant design, even though no spectacular performances have been achieved.

provided by *Lady Babs* 2 in the "C" Restricted race, but unfortunately the course was not completed on either run. This was the first appearance of this boat for some time, but Mr. G. Stone hopes to compete more frequently next season.

SCREW THREAD FINISHING AND RUNNING-OUT

(*Continued from page* 476)

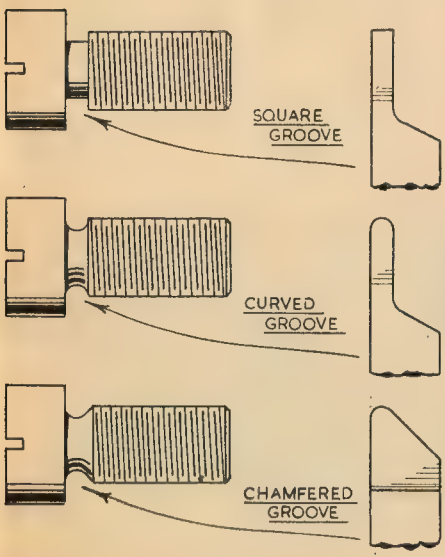


Fig. 6. Three forms of screw thread run-outs

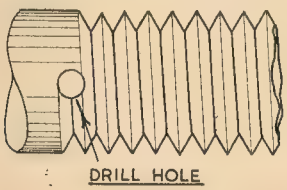


Fig. 7. A drill hole serving as a thread run-out

of the Milnes lathe was a quick-acting release fitted to the cross-slide feedscrew; this enabled the tool to be rapidly withdrawn clear of the thread, and then returned to the original position before taking the next cut. By this means, the machining could be safely carried out at greatly increased work speeds.

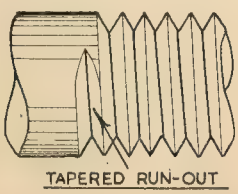


Fig. 8. A run-out formed by withdrawing the screwcutting tool

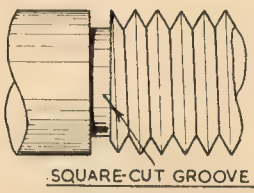


Fig. 9. Undercutting the work to form a run-out for the tool

Perhaps the easiest way of cutting the thread to a finish is, as shown in Fig. 9, to start by machining a groove with a parting tool to the full depth of the thread. This groove should be made wide enough to allow time for disengaging the tool without having to stop the lathe. After the thread has been machined, the sharp edge left at the end of the thread is removed by taking a light cut with a chamfering tool.

FIRE-FIGHTING APPLIANCES IN MINIATURE

By Victor Sutton

Left to right : War-time escape tender, Fire-engine of the future, Home Office heavy deluge pump, Dennis Light 6 open-type pump, Transverse seated pump-escape, Jenson semi-enclosed heavy Home Office pump unit

WHEN I came to cover the period from 1665 to 1910, this meant making 33 of these old-time appliances. Actually there is hardly a gap in development which is not covered in the whole series. At the same time, I do still occasionally slip in some oddity which comes along, or I am inspired by an illustration sent to me by some admirer.

One of the most interesting in this category is the "new carriage for a fire engine" of about 1791 and built by Mr. William Stanes of Chelmsford, Essex. This came about due to the fact that the popular Newsham hand pump of the period was unable, owing to its absurdly small wheels, to be transported to farm fires and thus one finds a large wheeled carriage with a ramp at the back and the Newsham perched on the carriage. Hoses were carried and 3 or 4 farm horses were needed to pull the contraption. One wonders why large wheels could not have been added to the Newsham to save all the bother, but that, perhaps, would have been too much like progress !

One finds quite remarkable variety in the designing of fire appliances, and, indeed, few fire engines are alike, because local circumstances alter styles. Not many years ago nearly all London stations would have four engines, comprising one escape, one turntable ladder and two pumps. This is now altered because the escapes are all pump-escapes, turntables are turntable pumps and the original pumps carry mostly 35-ft. extension ladders. This means more power with less men and machines.

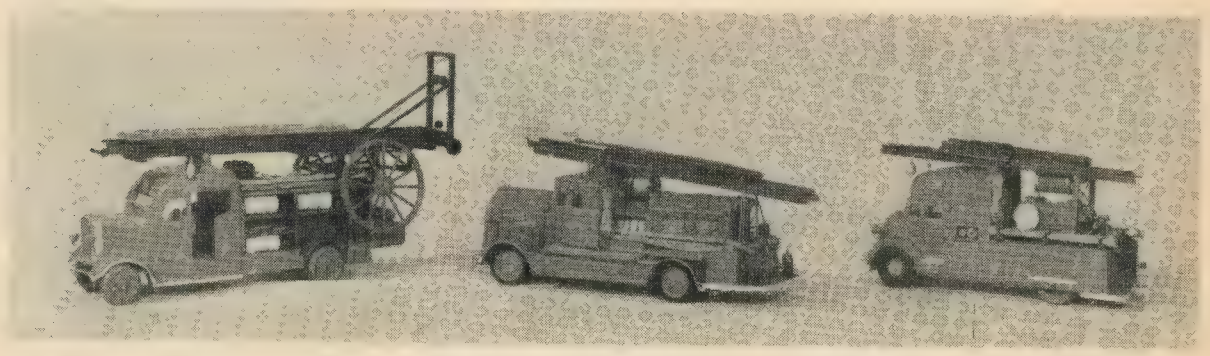
Open-types

The open-type fire engine is still with us today, although the tendency is to replace with the covered types and bus-like vehicles. Originally these had solid tyres, no windscreen and carried six men. The large lockers held all the equipment and the pumps were always rear-mounted and the suction hose, in two lengths, was generally fixed, and it curled round, snake-fashion, to hitch up along the side of the foot-rests. This feature is now disappearing due to improvements in hose fittings. With deep and wide boxes fitted between the mudguards it was amazing what these machines carried. But as fire fighting equipment and fire hazards increased, one became aware of all the odd bits and pieces which were being added to this well-designed appliance. Perhaps, in the combination pump and escape which was and still is so popular in medium-size town brigades the machine became the fireman's dream of a "Christmas tree on wheels" ! No wonder the back springs looked a little strained at times. . . .

In this type the pump was rear mounted and the escape, mostly a 50-footer, was carried above this on a special gantry. What space was left on running boards would be fitted with all types of extinguishers. A 30-ft. ladder rested on the escape, a search-light appeared on the fore part of the structure and the first-aid box got worked into a small gap between wheel and mudguard. The first-aid hose reel was carried under the escape and here we see added also a collection of polished boxes with various types of lamps and gadgets. Some also had two permanent hose-moniters on the top of the body. Suffice it to say that four firemen did manage to get on and sit down—but only just !

The First Away

The escape vans, as they were called at one time, were similar in construction



Left—War-time enclosed unit with 50-ft. escape. Centre—Very heavy deluge Home Office pump. Right—War-time semi-enclosed pump

Left—Fire engine of the future; Centre—Denn's Light 6 open-type pump; Right—Transverse seated pump escape

and carried the 60-ft. escape. This was always considered the first machine to be away from any station. These fire appliances always carried additional hose supplies because they had the extra space. A later and very attractive development was the transverse seating by which two sets of seats were planned and the storage bays were considerably wider than on the old version. Two sets of wind-screens were fitted and some of these machines are still in use in London and the large towns.

Model escapes themselves take a long time to make, and I consider they each need 12 hours of work. All rungs are separately set and the wheels made with fret-sawn rims, finished with silver card afterwards and the spokes are put in with $\frac{1}{8}$-in. dowel let into plastic wood held together with two model aircraft wheels. I do not like the completely fret-sawn version, because it gives a rough and badly shaped spoke. I have 10 escapes in my modern set—apart from the old-timers.

I have also two open-type emergency tenders which are the forerunners of the present totally enclosed version. These carry four searchlights, compression cylinders, heavy gear and lifting tackle and a crew of six.

"How Realistic"

The modern emergency tender is a large bus-like type and all gear is carried in specially constructed lockers. I found much interest in making this equipment from hairpins, paper fasteners paper clips, drawing pins, bent wire, beads, bits of dowel and a good collection from the galleon making kit. But everybody says, "how realistic," so I suppose I have succeeded.

Mudguard frameworks I make up with the tin bands off fish paste pots, and to these I mould my tin or cardboard. I often take wood from the sides of an orange box because this helps me to get the deeply-domed roof sections of the modern type covered vehicles. I use strip obechi for all ladder and small section, but never balsa at any price. I use several thicknesses in plywood and stock quite a range of good cardboard in as many thicknesses as possible. All seats are lined with Passe-Partout grained paper and gold lining is done with gold-paper strip in preference to paint lining.

The modern hose-relaying tender is a further item of great interest. It is all enclosed and carries six men, and the hoses are linked in continuous sections and hung on specially adjusted hooks. The sides, nearly to the full length, are opened and a running board is lowered on either side and on this the fireman unhitches the hose while the vehicle is in motion. I make the hoses with fawn tape from the drapers, in the $\frac{1}{4}$ in. width.

Perhaps one of the most interesting models to make has been the enclosed pump-escape and the construction here has to be such that the escape fits into the roof section and does not interfere with the deep lockers on either side, all of which I make openable, and they are fully stocked. The difficulty in this type of model is to make the escape fit inside the coachwork and also miss the running step at the back. Space on the roof has to be worked to a fine degree to carry two hose reels, two searchlights and two sets of scaling ladders. Suction hoses are often carried in this section, also.

Rural Novelty

The Land-Rover fire engine is a novelty only seen in rural areas where they are so useful because of their ability to run on unmade roads. The model can be made with some oddments of tin and wood blocks and there is now a version of this adaptable machine with a pump unit, rear-mounted. Good photographs of this machine were obtained from the Rover Co. Ltd.

A very attractive model is the heavy breakdown lorry which, in London, often has the most calls in any one week of service. This has a semi-enclosed body with a platform at the rear, on which is mounted a very heavy type of crane. Although I carried this out in oddments of wood, etc., this would make a very effective job for the engineer. Mine carries a crew of four and the lockers are complete with all equipment. The stack of wooden blocks carried amidships for shoring up vehicles always creates interest.

Various Turntable Ladders

I have three turntable ladders because I found three makers of this appliance and the style of construction is quite different. Mine each have four sections, with 60 rungs a set, and there is a light framework along the sides of the whole length. I find it easiest and best to plan the design on Bristol board and then glue on the $\frac{1}{8}$ in. square struts. Two of these vehicles are just turntable ladders and the latest is an enclosed type with side-mounted pumps. Although 5 ft. high when fully extended they are weighted to keep their correct balance.

The engine of the future has not yet been made officially, but I have it as a model! It is an amphibian with pumps and steering wheel at each end. Twin sets of seats are fitted and a large first-aid hose reel at each side. It has six wheels and retractable twin wheels are fitted at each end to assist it up the banks of rivers.

Our Cover Pictures

Readers of *THE MODEL ENGINEER* are invited to submit for consideration photographs which may be suitable for cover pictures. The subject must be within the scope of this journal and reference to the covers of this year's issues of the "M.E." will give an indication of the type of photograph preferred. If accepted for publication, a reproduction fee of two guineas will be paid.

Prints should be addressed to . . .

The Managing Editor
THE MODEL ENGINEER
19-20 Noel Street
London, W.1.

West Midlands Fede

Photographed by "Northerner"

Above : D. E. Campion of Cape Town was visiting with the Rugby club. His free-lance 0-4-0 "Topsy" is a "first attempt," but steams and runs very well

Right : Young D. G. B. Merrick of Oxford is making excellent progress with his "Schools" class S.R. 4-4-0, but the L.M.S. tender was borrowed for the occasion !

Left : Championship Cup winner in 1951, the "Duchess of Buccleuch" built by Thomas A. Bott has since proved her worth in many hours of running on the track

Right : The 3-in. scale free-lance traction-engine built by L. E. Boll of Birmingham, and driven by his son Martin, was a very popular attraction at the Rally

eration Rally at Birmingham

Right : Seen here in the steaming bay, the "Hielan' Lassie" built by A. G. Bates of Coventry was much admired for the clean workmanship and good finish

Below : H. R. Jones drives an engine built to "L.B.S.C.'s" "words and music"—the "Princess Marina," by K. Lapper of Wolverhampton

Below : H. Barr, a "top-link" driver of full-size locos., enjoys himself driving the 5-in. gauge G.W.R. 0-6-0, built by F. Shrieves of Sutton Coldfield, to "L.B.S.C." design

Left : "Pamela" the S.R. Pacific "rebuild" seen here, was built by S. R. Wakefield of Leicester ; apart from slight modifications to piston-liners and "plumbing," she, too, is pure "L.B.S.C."

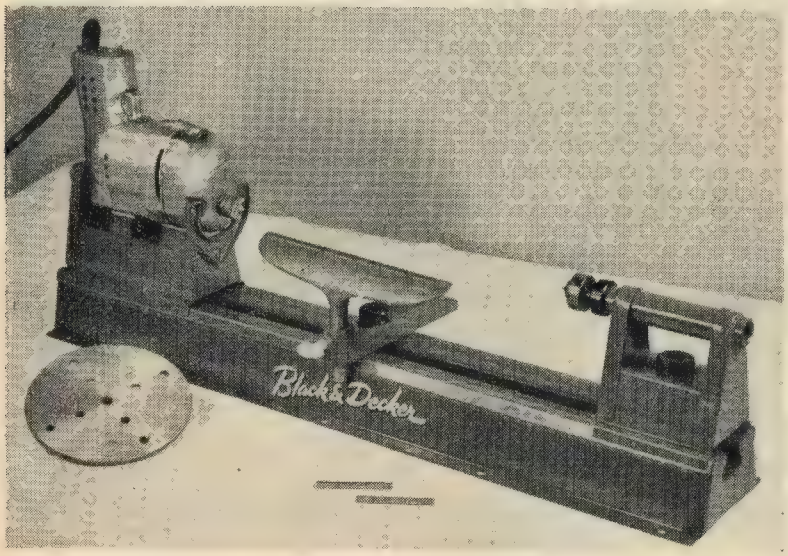
Trade Topics

AMONG the equipment demonstrated on the stand of Messrs. Black and Decker Ltd. at the "M.E." Exhibition was a simple and inexpensive wood-turning lathe intended to be powered by the Handy Utility ¼-in. electric drill or the 5-in. sander/polisher. This device incorporates several novel and interesting features in its design and manufacture, including the extensive use of pressed steel sections and fabricated components, resulting in extremely light but strong structure.

The bed is built up from pressed steel sections forming front and back shears, with cross members spot welded thereto, and both the headstock and tailstock are built up from pressings fabricated in a similar manner; the former comprises a holder for the electric power unit, which is located by two steady pins in a bracket at the front, and clamped in place by a single screw at the back. Both this and the tailstock are clamped to the bed by single central bolts and can be adjusted to suit the length of work to be turned, the final adjustment being by a screwed tailstock centre with a locking collar. Maximum length which can be accommodated between centres is 12 in., and maximum diameter which can be turned is 2⅝ in. between centres or 5 in. on faceplate. A wide toolrest, with vertical and horizontal adjustments is provided, its base being clamped to the bed by a single bolt. Fittings include a prong driving centre, and a 5-in. faceplate, both of which screw on the nose of the power tool and are interchangeable with the standard drill chuck supplied with the latter.

In addition to its primary use as a wood-turning lathe, this appliance can be employed for grinding, polishing, buffing, etc., as an alternative to the stand fitting available in the Handy Utility range of accessories.

Tests with the "Craftsman" lathe in the "M.E." workshop have proved it to be capable of much useful work in turning ornamental objects, patterns, etc., in hard or soft woods, or plastics, and the power obtainable from the electric tool is adequate for this class of work. Small parts in brass or other free-cutting metals which can be held in the drill chuck, or on the faceplate, can also be turned successfully, though the appliance is not claimed or intended to be a metal-working lathe. The makers of the "Craftsman" lathe are Black and Decker Ltd., Harmondsworth, Middlesex, and it is obtainable through all tool dealers.



The "Craftsman" wood-turning lathe by Messrs, Black and Decker Ltd.

"Shell" Easing Oil

The virtues of easing or penetrating oils for the purpose of freeing rusted or seized fittings are well known to engineers, and in the overhauling and repair of machinery they often make it possible to dismantle parts which would otherwise have to be cut away or scrapped. We have recently made very thorough tests of a new easing oil marketed by Shell-Mex and B.P. Ltd., which in addition to its inherent penetrating qualities, also contains colloidal graphite and other ingredients which improve it still further. An application of this oil to rusted nuts, pipe joints, springs, hinges or bearings will usually free them in a short time, though in obstinate cases it may be necessary to allow it to soak in for a longer period or apply it two or three times. This oil is marketed in 8-oz. tins with a special nozzle, obtainable from all ironmongers and tool dealers.

Abrasive Materials

Messrs. R. W. Greef & Co. Ltd., 12, Finsbury Circus, London, E.C.2, have submitted samples and technical details of their new range of abrasive papers and cloths, including their "Wetordry" Flint paper, which is made in all grades, and has a tough waterproof backing, suitable for either wet or dry work. "Tri-M-ite" paper, which is made in a similar range of grades, with the same backing, is coated with silicon carbide abrasive, and "Three-M-ite" cloth has a closed coating of aluminium oxide. These materials are obtainable in sheets, rolls, discs and cones, together with accessories such as rubbing blocks, felt pads, squeegees, and also a very ingenious abrasive "file" embodying a holder for an abrasive roll six feet in length, with a working surface of 11 in. ready for use and instantly renewable.

Kennion Bros. Catalogue

We have received a copy of the latest catalogue issued by Kennion Bros. (Hertford) Ltd., which lists a wide range of tools and materials suitable for model engineering generally and locomotive construction in particular. The "K-B" brand of taps and dies now include Whitworth, B.S.F., B.A. and "M.E." fine thread standards, also special items such as piloted and boiler-stay taps. Materials include all standard sections of brass and bright drawn mild-steel, brass and copper tubes, bronze and gunmetal rods, silver-steel, spring-steel wire, and a full range of bolts, nuts, screws and rivets.

L.B.S.C.'s Lobby Chat

● A "SPAM CAN" WITH VARIATIONS

WELL, it's here—the first "spam-canette" ever to be illustrated in these notes ! The builder, Alan Giffard, apologised for sending me the picture; but he needn't have done that, because the little engine is akin to a glamorous film star playing the part of an ugly sister in the Christmas pantomime. In fact, as the kiddies would say, "she looks just what she ain't." She is built to 3½-in. gauge, and has taken friend Alan seven years of hard labour to build her, starting at the age of seventeen, with a 3½-in. lathe, a hand-driven bench drill, and a few hand tools; further equipment being acquired as the work proceeded and circumstances permitted.

There are no weird and wonderful chain-driven contraptions under that "air-smoothed" casing ; just the "works" of a *Hielan' Lassie*, but with the drive all on the middle axle. The three cylinders are 1 3/16 in. bore, and 1⅝ in. stroke, the outside valves being actuated by Baker valve-gear, and the inside valve by a two-to-one conjugation. Each cylinder has a separate mechanical lubricator, of your humble servant's "standard" pattern. The position of the inside cylinder made it necessary to fit a smokebox of the same type as that on the full-size engines, with a similar chimney, which is 1⅜ in. diameter at the choke, tapering to 1⅝ in. diameter at the largest part.

The boiler is made of copper throughout, and is 4¼ in. diameter at the first ring, tapering to a little over 5 in. diameter at the throat-plate. The barrel contains sixteen small tubes and three superheater flues, and there are two thermic syphons in the firebox. The regulator is the same as I described for *Pamela*; there are three pop safety-valves on the front part of the barrel, and our friend says that they certainly pop all right, but sometimes lift water. All the joints in the boiler, the outline of which conforms to full size, are riveted and brazed. The grate measures 6 in. × 5 in. and the working pressure is between 80 and 90 lb. The fittings include two water gauges, and a "butterfly" firedoor.

At present, the boiler is fed by an eccentric-driven pump; but our friend says that this winter he will be fitting her with an injector made to my specifications, having heard that quite a number of builders have fitted injectors of this type, and, finding the pumps unnecessary, have taken them off. This saves two pipe connections being made between engine and tender, when coupling and uncoupling. Incidentally, I seldom use the pumps on my own engines; and it may be recalled that the record-breaking *Lassie* was injector-fed for the whole of her ten-hour-seventy-mile run. Anyway, in view of the fact that it was a person named Giffard who invented the injector, Alan's injector should certainly be the cat's whiskers !

The tender is just a normal affair with a tank capacity of 1½ gallons. As to performance, up to the present time, the engine hasn't had a real chance to show what it can really do, running being confined to the 280 ft. straight run of the Brighton and Hove club track; but she steams very well, with quite a small fire, and is a job to keep quiet. One thing that she has in common with the full-size engines is a tendency to slip; this may right itself when the wheel treads bed down a bit to the rails. Our friend certainly deserves commendation for the time and patience put into his locomotive-building, and for its successful completion; and he now says that he is going to build one of those awful nightmares, the "queer ones" (Q1 class) with the boiler casing like an Anderson air-raid shelter, and dome and chimney like an ash-bin and pail. But—tell it not in Gath—he proposes to put in cylinders and motion, same as I described for the L.M.S. 0-6-0 *Molly*. Wise man !

Non-slip Couplings

Three readers in different parts of the country have recently raised the question of safe couplings between locomotives and cars, when hauling heavy passenger loads. In one case a pin worked out, and the engine started to scoot off on her own; but fortunately somebody grabbed the tender, and managed to shut off steam, otherwise she might have caused serious damage and perhaps personal injury. This occurred on a long continuous club track, and there was another train running at the time; so what would have happened if the runaway had chased it and crashed into the back, at high speed, is easily imagined. In the second instance, a chain link opened out under a heavy pull; and in the third, the coupling jumped off the drawhook,

A "spam-canned" "Hielan' Lassie"

the engine ran away, and derailed at the first curve, fortunately landing in soft earth without damage.

It is surprising what a pull a little locomotive can develop. I recollect that about 25 years ago, I took the old original *Fayette* to a club meeting at Ilford, as the members wanted to see her shift a big load. The track was a portable one mounted on trestles, and the rails of rectangular iron. The coupling on the leading car was a plain three-link one, the links being made of 3/32-in. silver-steel bent to shape, but the joints were not brazed or otherwise secured; if anybody tries to bend similar material with their fingers, they would think such links were perfectly safe to withstand the pull of a 2½-in. gauge locomotive. Anyway, I thought so at the time; but old *Fay* promptly showed me that I didn't know the answer to *that* one! She ran easily up and down with two and three passengers, so we put all three cars behind her, with a load of five adults. I wasn't riding, but walking beside her, so that as many members as possible could ride, and take a turn at the throttle.

She was blowing off heartily at 100 lb. when the driver opened up; the old cat kind of "dug her heels in" on the iron rails, and as she gave a mighty heave, I was absolutely amazed to see the middle link of the coupling start to open out! Naturally, I grabbed her mighty quick, and we fixed up a more secure coupling before proceeding any further; but ever since that night, I have never used a coupling with unbrazed links, for coupling a locomotive to passenger cars.

I never attend fêtes, or any other functions, nor do I visit club tracks any more, for a reason which I need not explain here; so I don't know what sort of couplings are in general use for pulling loads of children and adults at these "do's." However, if I were running such an outfit, my couplings would be the simplest, safest, and cheapest possible; simply a three or four-link chain with brazed joints, secured by stout commercial split-pins put through forks on both locomotive and cars. The regular coupling on the engine would be replaced by a temporary fork, drilled across for the split-pin, which could be ¼ in. diameter for 5-in. gauge, or even bigger than that. The car would have a permanent coupling fork of similar size, and a chain with links made from, say, $\frac{3}{16}$-in. mild steel with brazed joints. The split-pin holding the chain in the fork on the car, would be opened out permanently so that it couldn't come out of its own free will and accord. The one on the engine would be opened out sufficiently, after coupling up on the track, to prevent that coming out also. I don't imagine that there would then be any "slip-couplings" on *that* train! It might be asked: why not a piece of flat bar between the forks on engine and car, with holes at each end for the pins? My own experience, with such a rigid coupling, is that it tends to throw the car off the road when stopping, if brakes on the engine are used; also when the engine is pushing the train, as is usual on the up-and-down portable straight tracks commonly used at public functions.

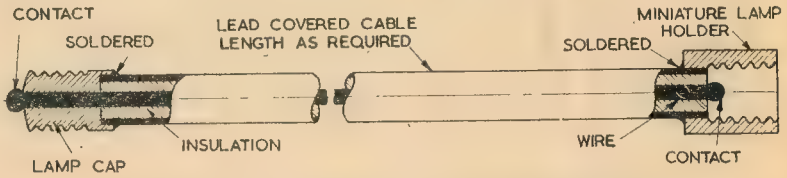
On my own little railway, I use similar couplings, but much smaller. The cars run on 3½-in. gauge, so I use two forks in the car beams, one being set right for coupling to 3½-in. gauge engines, and the other at a lower level, and to one side, in line with the drawbar hooks of 2½-in. gauge engines. Both sizes can then get a straight pull at the car; there is no pushing, the line being continuous. The only cases of "slip-couplings" that we ever get is when one of my few friends shuts off steam and doesn't apply the car brake quickly enough to prevent the car bumping into the engine, which sometimes jumps the chain off the hook. All the locomotives, excepting *Annabel*, have the ordinary hook and coupling; she has a socket for the shank of an automatic coupler, but I've never fitted one. The projecting part of the socket has a split-pin through it, for holding the car chain. A simple and quickly-operated alternative to the fork and split-pin would be to use safety hooks, such as fitted to dog leads. The one on the lead which I used for my old Micky of fond memory was just a pear-shaped loop, with a section at the narrow end which could be pressed inward, sufficiently to allow the gadget to be slipped over the ring in the dog's collar. When released, it sprang back into place, and it was impossible for it to come adrift by accident. When I was a small kid, pocket watches were often attached to their chains by a similar device, the idea being to foil pickpockets.

Aids to Oiling-up

In those happy days long past, when enginemen took a pride in their job, and didn't mind a spot of work, there was no fussing about "preparation, availability, and disposal" of engines at "motive power depots." The lads of the L.B. & S.C.R. would have laughed at such "high-faluting" terms! Drivers and firemen booked on, usually an hour before train time, at the running-sheds, and got their engines ready for the road themselves. When they returned to the shed, drivers examined their engines and made out their sheets, booking up any repairs that needed attention by the shed fitters or boilersmiths, whilst the firemen did the needful in the ash and clinker department, attended to lamps, sandboxes and so on, and they put the engine away in the shed themselves. It was all in the day's work, and we would have well and truly resented any interference by a shed gang.

Before I take one of my little engines out on the road, I usually perform the same old ritual of looking around and oiling up; and for getting at the underneath of an inside-cylinder engine without turning it upside-down, I use an oil-feeder with a long extension on the spout, and a special electric "torch-lamp." A friend who saw me do this for the first time, when on a visit, was so tickled that he said he would fix up a similar feeder and lamp for his own use, and suggested that I mentioned them in a future lobby chat, so here is what our R.A.F. friends would call the "gen." The oil feeder is just an ordinary force-feed gadget with a length of soft copper tube soldered into the spout; my feeder is a "Wesco," obtainable at any hardware store, and the extension tube is of thin-walled copper, 6 in. long. It can be bent by finger pressure, to reach otherwise inaccessible places. As the tube is only ⅛ in. diameter, it can be poked through almost any cranny, in between splashers, amongst the valve-gear, and so on.

The lamp is just a flat three-cell 4½-volt pocket torch, with the bulb carried on an extension. On my own lamp, the extension is a piece of thin brass tube, with a single-contact cap from a blown bulb at one end, and a miniature-screw lamp socket at the other; a bit of bell-wire joins the middle poles, and the return is through the metal of the tube. I told my friend to use a bit of lead-covered cable instead of the tube, as the cable, being flexible, allows the extension to be readily bent to any desired shape, thus rendering the gadget more handy than if the extension were rigid. When running a locomotive at night, I carry this lamp on the flat car, and find it exceedingly handy, as the extension allows the bulb to be put right alongside the water gauge, showing the level at a glance. The sketch explains itself; if there are two wires in the lead-covered cable, twist the ends together and use as one wire. Be careful to avoid melting the lead when soldering



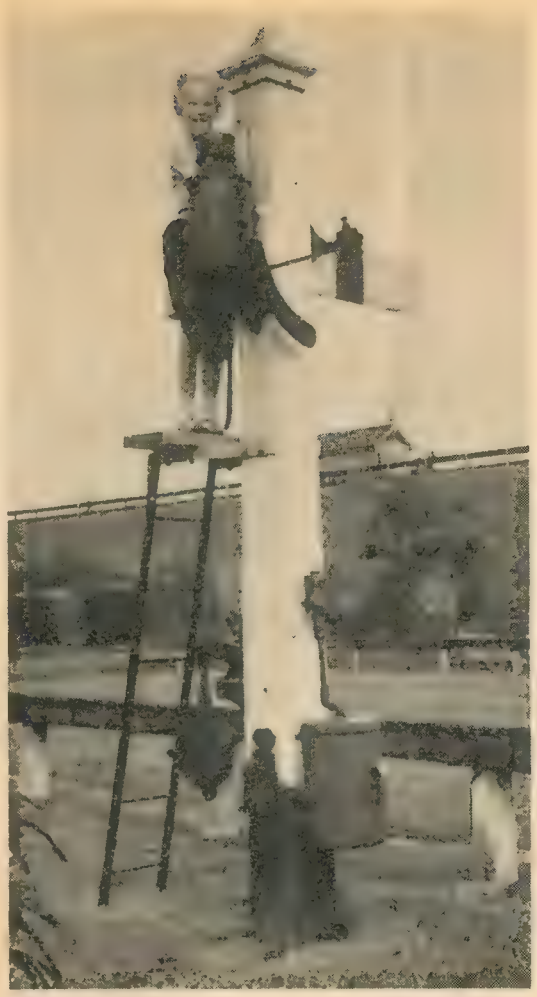
Extension for converting pocket torch to locomotive inspection lamp

the cap and lamp-holder to the cable.

Locomotive Building at Sea !

A letter recently came to hand from the chief engineer of a 28,000-ton "super-tanker," the turbine engines of which take steam at 500 lb. pressure and 750 deg. superheat. Commenting on, and confirming my remarks about the benefits of really hot steam, our friend says that only a 50-deg. drop in superheater temperature sends his fuel consumption up by three tons per day. As with giant, so with midget; he tried an experiment with a little engine built for a toy boat. It had a single-acting oscillating cylinder, $\frac{3}{8}$ in. × $\frac{3}{4}$ in. and a plain pot boiler 4½ in. long × 1½ in. diameter, fired by a spirit lamp with three ¼-in. wicks. The safety-valve is set to blow at 15 lb. With a ⅛-in. steam pipe having a hairpin loop in the lamp flame, the engine starts always as soon as steam is up; and with only two wicks then burning, the engine buzzes away at terrific speed for 26 minutes before the boiler runs dry, after starting with it two-thirds full of water. If the three wicks are burning, the safety-valve will blow off all the time.

With a steam pipe only 1½ in. long, going direct from boiler to cylinder, the engine takes some time to warm up, blowing water from the exhaust; and with the three wicks going all the time, the safety-valve never blows off, whilst the engine doesn't run nearly as fast, and the water is all used up in 12 min., the exhaust being very wet all the time.



Lampgirl Jane Samuel does the needful on the "down main home"

Our friend builds steam locomotives aboad the ship. He has made two *Mollyettes* from scrap material; one to specification, and the other as a 2-4-0 with link motion, based on *Petrolea*. Both were very successful. Next came a *Tich* with loose eccentric gear; she never got a proper test, as there was no coal on board, and she wouldn't burn the kind of coke available. However, when fired with wood soaked in paraffin, she would dash up and down the deck, without any rails, and was eventually purchased by one of the sailors who took a great fancy to her. She also was built from available oddments, using the ship's 10-in. lathe plus an 18-in. four-jaw chuck, after which our friend had enough of using a steam hammer to crack walnuts, so he built himself a 2½-in. back-geared screw-cutting lathe and a ¼-in. sensitive drilling machine.

When on leave, he took his two children, boy and girl, to see the then new track of the Newcastle-on-Tyne club, and that did it ! He said that he was amazed to see a 2½-in. gauge *Austere Ada* pulling its driver and eight children, also the way that a *Hielan' Lassie*, and a *Doris*, did the job, apparently without effort. When his own children heard that the engines were built by their own drivers, dad promptly got a commission to go and do likewise; they wanted an engine that they could drive for themselves, so the "Six-year-old's 4F" was started. But by this time, dad had caught the complaint as well, and he made a *de luxe* job of the engine. She was fitted with link motion, Belpaire firebox casing with a wet backhead, and full set of boiler mountings. Only the wheel castings were purchased, and the whole of the machining was done on the little home-made lathe.

The "super-4F" was built aboard, and was a great success. On its very first trial, it bolted, and crashed into a bulkhead, fortunately without damage, owing to the spring buffers. A driving-car was built, the channel frame of which, and the ball bearings for the wheels, once formed part of an American filing cabinet. Our friend found two 12 ft. lengths of 1-in. angle-iron among the engine-room stores, so these were borrowed, and laid on the deck as a temporary testing track. The engine pulled everything that could be piled on the car, so our friend sat on it himself, and with a full head of steam, the engine shifted his 15-stone, with a mighty effort ! Readers may recall that this engine is a 2½-in. gauge 0-6-0 with a spirit-fired boiler, and one solitary cylinder; I built the original for the then six-year-old son of the chicken-farmer with whom we stayed when evacueeing from the "doodle-bugs," as a job which he could safely manage "on his own," and run on his father's line. The chief engineer's children had no trouble in running their version, and it pulls either of them without any difficulty.

Our friend, having, like myself, a fondness for old-timers, decided to build a 5-in. gauge edition of a real museum piece, to wit, a Bury goods engine, 0-4-0 type, period about 1840; and started on the boiler, the copper for which was once an electric water-heater. This had to be pulled to pieces, and the plates flattened; a nobby job ! Just at this time, I had described and illustrated the boiler for the 5-in. gauge *Titfield Thunderbolt*, so our friend based his boiler on this, the size being almost identical. No tube being available, the barrel is rolled up, and has a double-riveted butt strap joint. The firebox casing is built up, and flanged out to take the barrel. The inside firebox is the same as the *Tit*, with similar roof girder stays. All joints are riveted, and Easyflo is being used as a seal. Brazing is out of the question, as an open coke fire is taboo aboard a tanker; and the only place where the silver-soldering can be done is in the stokehold, where the temperature is usually about 110 deg.—mi gosh ! ! It certainly needs enthusiasm to go boilersmithing under those conditions. Our friend concluded his most interesting letter with a query or two about the locomotive, and added a very kind appreciation of these notes, which, coming from an engineer with his qualifications and experience, is gratifying indeed, and I bow gratefully. Well, brother, good luck with the "old iron," and don't forget to let us know how she pans out; that is, if you don't melt down to a spot of grease when boilersmithing in that hot stokehold !

Making a Simple Beam Engine

A CHARACTERISTIC DESIGN BASED ON EARLY NINETEENTH CENTURY PRACTICE

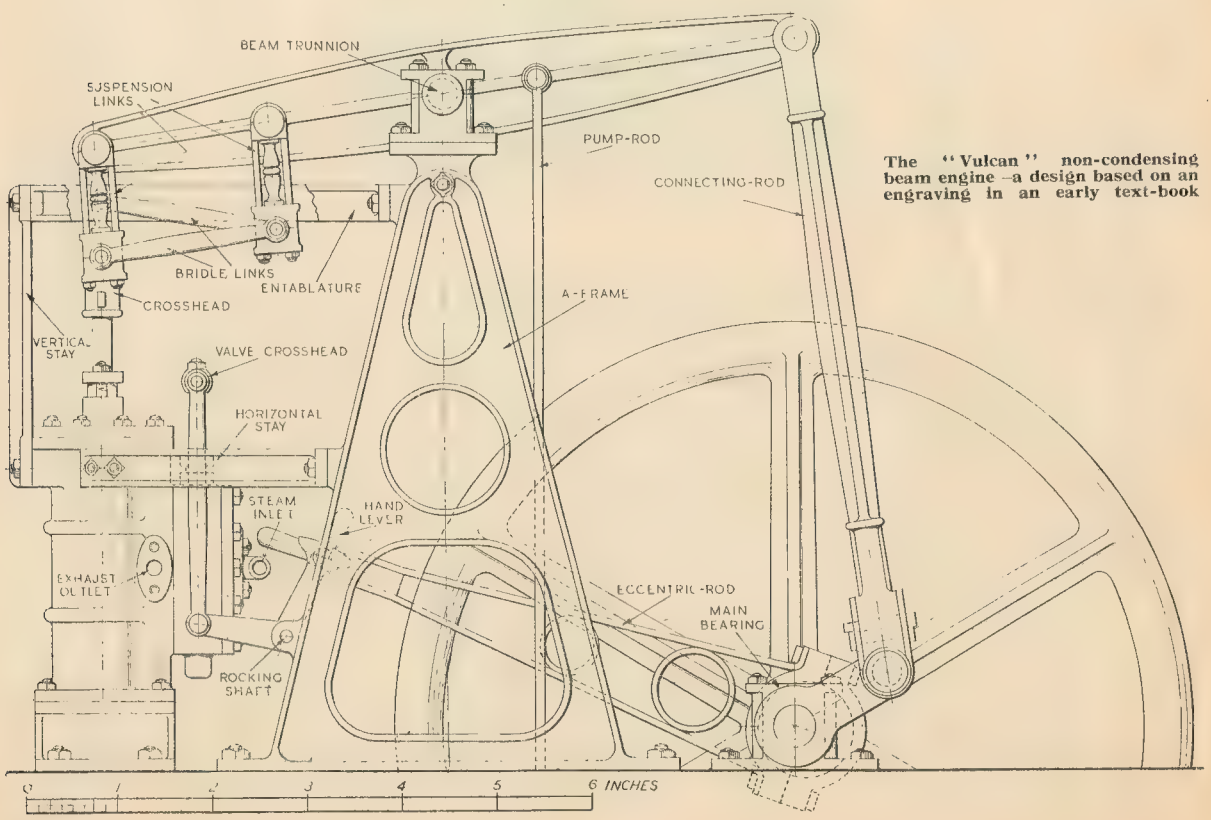
By Edgar T. Westbury

IN the course of correspondence arising out of the series of articles on utility steam engines, many readers have urged me to produce a description of a "real old-timer," and to deal with its construction in the same way as that of other engines in this series. There is no doubt about the fascination of the early historic steam engines, and the researches I have made in connection with mill engines have brought to light quite a number of interesting types, but it is debatable whether any of them, when reproduced in model form, should be classified as "utility" engines, so I propose to drop the title, at least temporarily, to forestall any possible controversy on the matter.

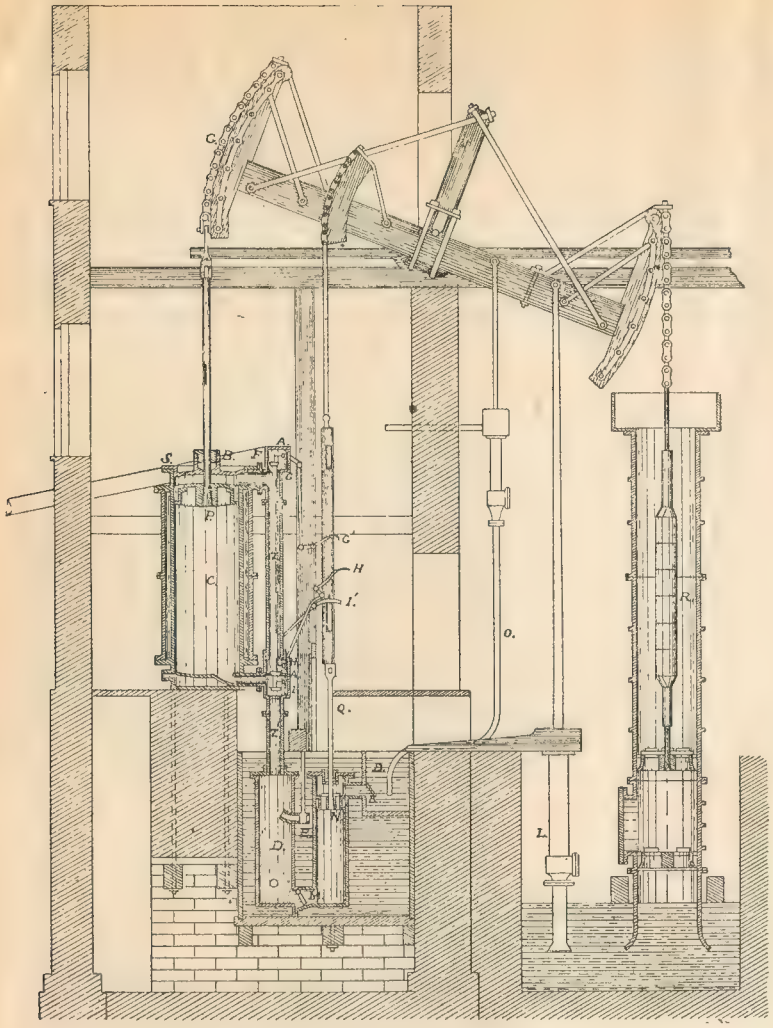
The earliest practical form of the steam engine, of course, is the beam engine, which was first applied for direct action of water pumps, and later adapted to rotary motion for driving machinery. Both types have been extensively copied in model form, but I think that most readers will agree that the latter, or "rotative," type, is the most interesting to the average constructor, whose object is not so much to preserve an accurate record of engineering development as to build a working model typical of its period, but without splitting hairs over matters of detail accuracy.

I trust that readers will not misunderstand me on this point; I am dead against the type of model so often seen, which may bear a superficial resemblance to an early type and embody similar basic principles, but is hopelessly out of proportion in its components, and full of anachronisms in details and constructional methods. At the other extreme is the meticulously accurate reproduction of some individual historic engine (it *must* be individual, as hardly any two engines were made alike in the early days), which is highly desirable as a museum or exhibition piece, but hardly suitable as a working model, and generally outside the scope of the average constructor. Throughout all my "utility" articles, my aim has been to steer a middle course between these extremes, and assist readers to produce working models suited to their methods and equipment, which, without being accurate in every detail, are reasonably proportioned and true to general character; this is the policy I shall continue to pursue, as I know that there are a large number of readers who wish to build reasonably accurate, but not meticulously detailed, models.

The beam engine was made in a wide



The "Vulcan" non-condensing beam engine—a design based on an engraving in an early text-book



An example of the Watt single-acting non-rotative beam pumping engine (*circa* 1770)

variety of forms, and most of them are well worth modelling, though in the very early types, design was often immature and crude; the use of wooden beams, and incorporation of the engine structure in that of the building which housed it, are features at variance with mechanical engineering as generally understood in modern times. But, very soon, engineers learned to produce self-contained and more compact engines, and also developed a sense of form and proportion, which resulted in something approaching real beauty. Not unnaturally, many of their ideas were borrowed or adapted from architecture, and these were reflected not only in structural design but also in terminology —such terms as "plinth," "column," and "entablature" are definitely of architectural origin, and many others can be traced back to the temples of ancient Greece or even Egypt. There is very little doubt that engineers would have continued to study form and beauty in the structures of engines, but for the harsh demands of "utility"—using the word in its worst sense. They soon found that hard-headed mill-owners were not prepared to pay for such refinements as dignified Corinthian columns and capitals which had no effect on the working of the engines, and quite early in steam engine history, there was a reversion to a form of design which is best described in modern idiom as "purely functional."

We may, perhaps, deplore this development, but actually it was hardly worse than the equally common practice of shutting up a really beautiful engine in a tiny, cramped rabbit-hutch of a building, which made it quite impossible to view it in proper perspective. As a matter of fact, true functional efficiency results in a beauty of its own, and ugliness is invariably a symptom of immaturity and inefficiency.

One of the finest examples of beam engine design which has ever been published in THE MODEL ENGINEER was the single-column type drawn and described in minute detail by Mr. George Gentry in 1914; the charm of this design has not faded with the years, and there have been several examples constructed in quite recent times. Requests for the re-issue of the drawings, and also castings, of this engine have often been received, but the work and expense involved in either precludes this, unless a really widespread demand should be evident. Another very interesting and handsome design was that of the Easton and Amos "Grasshopper" engine (*circa* 1860) described by Mr. A. Ebeltoft of Norway, in March, 1949, and several of these also have been built by readers. Incidentally, for the benefit of readers not familiar with the term, the "Grasshopper" type of beam engine was one in which the beam was pivoted at one end, instead of the more orthodox arrangement of a centrally-pivoted beam, with the crankshaft and piston rod connected to opposite extremities. This resulted in a more compact form of engine, but practically all forms of beam engines rapidly became extinct when engineers learned to build direct-acting engines successfully. I say "practically," because, though the traditional beam engine has gone for ever, the same principle of operation, but transmitting motion from piston to crank through a pivoted beam or rocker, has in quite recent years been applied to high-speed diesel engines, of all things!

The design of engine which I propose to describe here is one based on an engraving found in a very dilapidated and dog-eared text-book on the steam engine dated 1847—and at that date, several editions and foreign translations of it had been published, so that the actual date of the design could not have been later than about 1830. It is, in my opinion, a fairly typical example of one of the earliest engines of all-metal self-contained construction, in which the beam was supported on duplicate A-frames, instead of on the wall of the engine-house, as in primitive types. This is by no means the most elegant form of beam engine, but I have selected it not only because it is definitely representative of its period, but also because it is quite straightforward to construct by the methods and equipment available to most model engineers.

I may say at once that I have not attempted to adhere exactly to the details of the prototype. In the first place, many of them are vague, and probably inexact, in the one and only illustration of the engine in the book; the art of technical illustration, such as exemplified in some of the excellent text-books published towards the end of the nineteenth century, was very much undeveloped when this one was prepared. I have also taken some liberties with details, in order to produce

a good working model, but I have adhered closely to the character of the design, and avoided the use of joints, fixings and minor fittings which are not truly representative of the period. This, by the way, is one of the features in which glaring errors are most noticeable; while one might condone such details as the use of hexagon nuts instead of square ones in a model of an early engine, it is inexcusable to fit screwed glands, massive flywheels, or "marine" type split crankhead bearings on such engines.

Features of Design

This particular engine, it should be noted, is without the customary plinth or bedplate; the illustration in the book shows it mounted direct on a timber framing, the under part of which houses the pumps and other auxiliary fittings. This is equally appropriate in a model, though there would be no objection to using a shallow bedplate casting or a piece of flat plate for mounting it; a pit will, of course, have to be provided for the flywheel, and it is also desirable to have the pump(s) fitted below the floor level, in keeping with the prototype, entailing the use of an open underframe.

The engine is of the non-condensing type, which most constructors will probably prefer; it could be adapted as a condensing engine without alteration to general design, beyond fitting an extra pump. All the main components are bolted directly to the main floor, the two A-frames being identical in design, and set up parallel with each other across the centre of the floor, secured by two bolts in the foot of each, and stayed by a single tie-bolt at the top. Both the main crankshaft bearings, and also the beam trunnion bearings, are of the split "plummer block" type. The beam is a casting, also the connecting-rod, the shank of which is fish-bellied, with a cruciform cross-section; the spokes of the flywheel are of similar section, and the rim is of circular section.

No doubt, in an engine of this period, the crankshaft would be of square section, but there is no definite evidence of this in the illustration, and I am of the opinion that a turned circular shaft, which is simpler to produce, and facilitates fixing the flywheel and eccentric, is quite permissible. The cylinder is mounted on a square pedestal or "stool," and its design calls for no comment, as it follows orthodox practice, but I have adapted it in details to suit the constructional methods of the model workshop. It has been necessary to exercise a certain amount of imagination in the design of the valve gear, as I have been unable to interpret the details shown on the engraving, and I have a shrewd suspicion that the artist who made the latter didn't know a great deal about it either! There is a distinct possibility that the actual engine was not fitted with a slide-valve, but a rotary plug cock operated through a bell crank lever from the eccentric-rod.

As was usual in early engines, means are provided for disconnecting the valve-gear and operating it by hand, to facilitate manoeuvring, though later experience showed the advantages of this to be questionable, and an unskilful engineman was more likely to get the engine jammed on one of its dead centres than anything else! The eccentric-rod is of the characteristic "openwork" type, terminating in a handle which enables it to be lifted to disengage the driving stud from the quadrant or "gab" of the bell-crank lever.

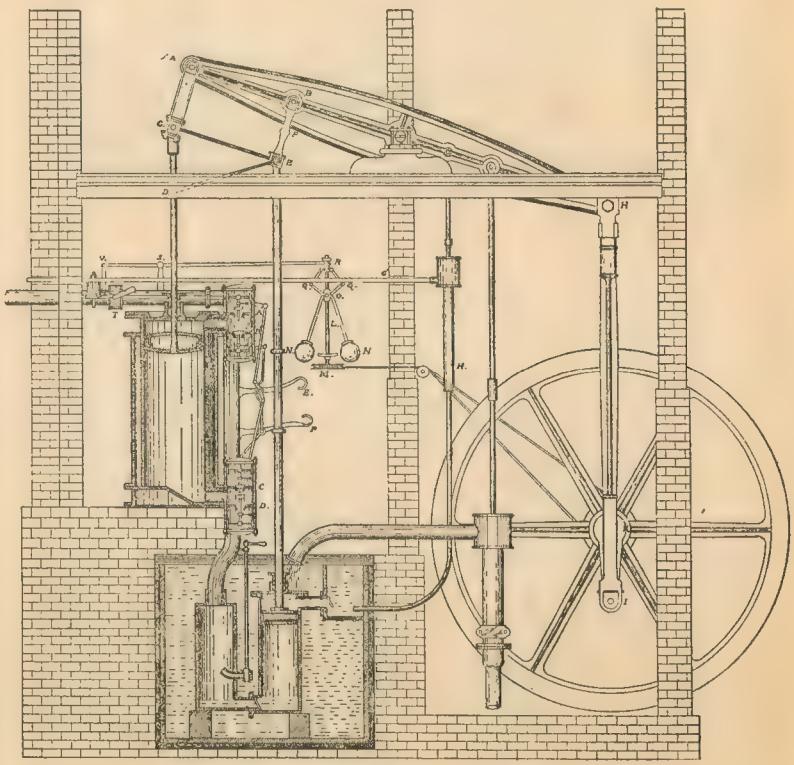
This engine is a little unusual in the design of the "entablature" or framing around the top of the beam supports and above the cylinder; in fact, it may be said to lack this feature, in its true sense, altogether. The normal function of the entablature, apart from general strengthening of the upper structure of the engine, is chiefly to carry the fixed pivots of the parallel motion, which guides the top end of the piston rod so that it moves in a straight line. In this case, a horizontal frame of U-shape attached at its ends to the tops of the A-frames, and at its centre to a vertical bar mounted on the cylinder, serves the purpose of the entablature.

Most readers are quite familiar with the mechanical principles of the parallel motion, which was used on practically all types of beam engines, and also on several types of direct-acting engines in the early days; but many readers may not understand *why* it was considered necessary to use this method of guiding the piston-rod by a system of swinging links, when the modern sliding cross-head appears so simple and obvious.

One reason was that a normal type of connecting-rod between the piston-rod and the beam, if made of reasonable length to avoid excessive angularity, and consequent side thrust, would very much increase the height of the engine, and the building necessary to accommodate it. Another, and possibly more important, practical reason was that many early attempts to use sliding guides were not highly successful, due to the difficulty of forming accurate straight bearing surfaces before the introduction of machine tools such as shapers or planers, Unmachined guide-bars gave considerable trouble through excessive friction or seizure, and the alternative method of guiding the rod, invented by James Watt, by replacing the guides by pivoted members, gave more satisfactory results.

The geometrical principles of Watt's parallel motion are quite straightforward and easy to understand; Mr. Gentry explained them at some considerable length in his articles on the

(*Continued on page* 492)



Watt's double-acting rotative beam engine (*circa* 1790)

Improving a Swivelling Slide

By H. Spinks

MANY model makers, must possess a really cheap, pre-war centre lathe, devoid of refinements. Such lathes had a compound slide-rest, which clamped to the cross-slide, by one $\frac{3}{8}$-in. bolt, through a lug cast on the rear side of the lower base. The bolt was usually a loose fit in the lug, and no graduations were present. Such a lathe can be improved as follows:

The tool-clamping stud is removed from the top sliding member, and $\frac{1}{8}$ in. is removed from the complete face, which must be kept flat and true to the underside, leaving just sufficient metal for the re-fitting of the stud; $\frac{1}{8}$ in. is also faced from the underside of the lower base. The original assembly will now be $\frac{1}{4}$ in. less in overall height. Turn a taper plug, approx. 2 in. diameter × $\frac{5}{16}$ in. thick, with approx. 12 deg. taper, keeping the smaller face flat and true to taper.

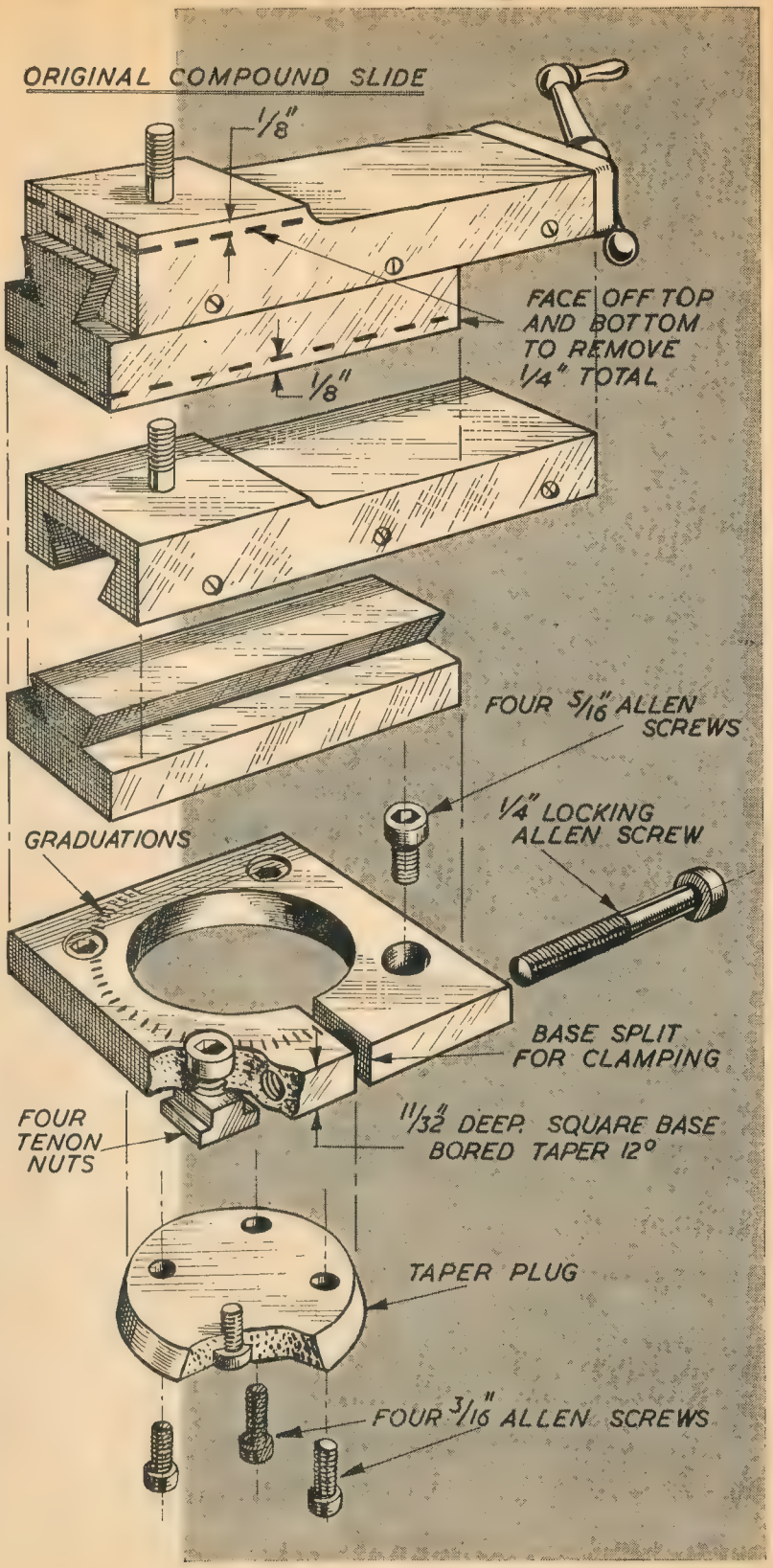
A $\frac{3}{8}$ in. thick baseplate completes the new major components and this should be designed, so that if possible four $\frac{5}{16}$-in. cap screws can be used to clamp it to the cross-slide, at each corner. It is important that the spacing be such, that the key can be inserted into the clamp-screws when slide is assembled, and if possible the front edge of base be level with front edge of top of cross-slide. This ensures that when the assembly is removed, and replaced, the markings "pick-up" correctly.

Having decided on the most efficient size of base, it is bored, and faced (lightly) with face at small end of bore true to bore, and taper exactly as on plug. The underside of base is now made parallel with top face. Plug and base should be scraped or lapped with compound, so that small end of plug and base are flush.

Front end of base is now drilled and tapped to take $\frac{1}{4}$-in. clamping screw, one half of hole being clearance. Drill and counter-bore four holes for $\frac{5}{16}$-in. screws at corners, heads of cap screws to be slightly below face. Cut through front into main bore.

The best position for plug on underside of original slide is assessed, and three or four holes drilled to fix plug firmly to underside.

Having made suitable tee-nuts, the unit is assembled to lathe. Set parallel to bed and take cuts, until slide is set exactly right. A zero line can be marked on upper assembly exactly at one edge of slot. Using faceplate and feelers, the tool can be traversed across faceplate to obtain 90 deg. setting, and a line is scribed on lower base for this setting. All other graduations can be scribed on base using a protractor across faceplate, with tool and feelers along blade.



QUERIES AND REPLIES

"THE M.E." FREE ADVICE SERVICE. Queries from readers on matters connected with model engineering are replied to by post as promptly as possible. If considered of general interest the query and reply may also be published on this page. The following rules must, however, be complied with:
(1) Queries must be of a practical nature on subjects within the scope of this journal.
(2) Only queries which admit of a reasonably brief reply can be dealt with.
(3) Queries should not be sent under the same cover as any other communication.
(4) Queries involving the buying, selling, or valuation of models or equipment, or hypothetical queries such as examination questions, cannot be answered.
(5) A stamped addressed envelope must accompany each query.
(6) Envelopes must be marked "Query" and be addressed to THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

Boiler for Mill Engine

I wish to make a boiler suitable for steaming a number of small models which I have made, and I was interested in the article on page 513 *of* THE MODEL ENGINEER *for May* 13*th last, describing the Trident Mark I boiler, which sounds as if it might be ideal for my purpose; I shall be greatly obliged if you will advise me where I can obtain the blueprints for this boiler, and also the necessary castings.*

J.H.D. (Tasmania, Australia).

Blueprints for this boiler are obtainable from our Publishing Department, Ref. M.10, price 5s. 6d. net.

Materials for its construction can be obtained from the Imperia Co., 4, Cranbrook Road, Ilford, Essex.

Machining Capacity

I propose to buy a 2½*-in. lathe with the object of constructing little steam locomotives to "M.E." designs. What would you consider to be the largest gauge or scale of locomotive that I could build with a lathe of this size?*

M.D. (Twickenham).

The largest and heaviest turning operation on most locomotives is the machining of the wheels, and, therefore, practically any locomotives having wheels not exceeding 5-in. in diameter should be capable of being constructed on a lathe of this size.

This would include several locomotives of 3½-in. gauge, but if you have not had previous experience in locomotive construction or machining, we suggest that one of the simpler types such as *Molly*, *Juliet*, or *Tich* would be most suitable.

Counting Mechanism

Can you please explain how the resetting mechanism of a "Veeder" counter works? I have a number of counter wheels from which I would like to build the adding machine recently described in THE MODEL ENGINEER, *but I can see no way of resetting other than slowly rewinding them in the reverse direction.*

J.M. (Epping).

We have no exact details of this mechanism, but we can explain briefly that the resetting gear operates through the pinions or tumblers, which are arranged on a shaft parallel to that which carries the counter discs. In the normal operation of the counter, each disc in turn operates through the tumblers to advance the next disc one digit per revolution. In the resetting type of counter, arrangements are made whereby all the tumblers operating together can be used to drive the counter discs backwards to the zero position.

The "Veeder" counters are made in many different types, some of which are equipped with resetting mechanism. We do not think it would be practicable to adapt a counter for resetting unless it is actually made for this purpose in the first place.

Sand Castings

When making castings in brass or aluminium, using black foundry sand for the mould, can the metal be poured while the mould is still damp? I have read various articles on this subject, but they do not mention this point, and I have wondered whether I am wasting time in baking moulds quite dry before pouring.

G.W.L.G. (Jersey).

A certain amount of dampness can be tolerated in the sand used for the mould, and is generally desirable to ensure its proper adhesion.

The amount of moisture present, however, must be very small, as excess of moisture will result in the generation of steam when the metal is poured, and this will result in blow-holes in the casting, or in an extreme case may even cause the mould be explode, with some risk of severe burns from flying metal.

Experience will show just how much moisture can be tolerated, but it is advisable to use extreme caution until this experience is gained.

Air/Gas Blowpipe

I have just installed an air/gas blowpipe, using a rotary blower delivering air at 2½ *lb. pressure. I have been informed that it is necessary to fit a non-return valve in the gas supply pipe; will you let me know if this is so, and whether it can be made in the home workshop, or where it can be obtained?*

B.S. (Woodford Green).

It is not necessary to fit a non-return valve in the gas supply pipe, and, in fact, it would be useless to do so, as in the event of a blowback caused by difference of pressure between the blowpipe and gas supply mains it would simply close the valve and prevent any gas flowing.

The normal type of air/gas blowpipe has an injector action which definitely draws the gas through by the discharge of air from the nozzle, even though the gas pressure may be extremely low. Some types of blowpipes have a diffusing device which is intended to prevent the possibility of the flame striking back through the nozzle, but even this is not usually considered a necessary fitting.

MAKING A SIMPLE BEAM ENGINE

(*Continued from page* 490)

"M.E." beam engine, and I do not consider it necessary to repeat his description. Briefly, however, it may be said that the pivoted links introduce an arc of movement, which is employed to cancel the arc of movement produced by the end of the beam. The proportions of the respective pivoted members vary in individual designs, but in the type employed for this engine, the essential requirements are that the radius of the bridle, or "radius" rods, should be exactly half that of the beam, the suspension links should be of uniform (but unspecified) length, and the fixed anchorage point of the bridle should be in true cross alignment with the piston-rod. Over a certain limited range of movement, the linkage will then guide the piston-rod in a substantially true axial straight line.

A model constructed to the dimensions indicated on the drawing will occupy a space of about 1 ft. long (from cylinder to flywheel extremities), 7 in. wide in the direction of the shaft axis, and 8 in. high from floor to top of trunnion bearings; if, however, it is mounted on an underframe, the height of the latter, which is 4¾ in. (to scale prototype dimensions), must be added. Many of the structural components can be made from castings, needing little machining or none at all, and the others can all be machined quite comfortably on a 3½-in. lathe. Both the number of parts, and the work involved in producing them, are much less than most types of beam engines, other than those of a very elementary type, which have hitherto been described.

No governor gear is fitted to this engine, as none is visible in the available drawings of the prototype, but it could quite easily be fitted, and if constructors consider it a desirable addition, I will endeavour to produce drawings of a governor conforming in character and period to the rest of the engine.

(*To be continued*)

READERS' LETTERS

Letters of general interest on all subjects relating to model engineering are welcomed. A nom-de-plume may be used, but the name and address of the sender must accompany the letter. The Managing Editor does not accept responsibility for the views expressed by correspondents.

BLOWLAMPS

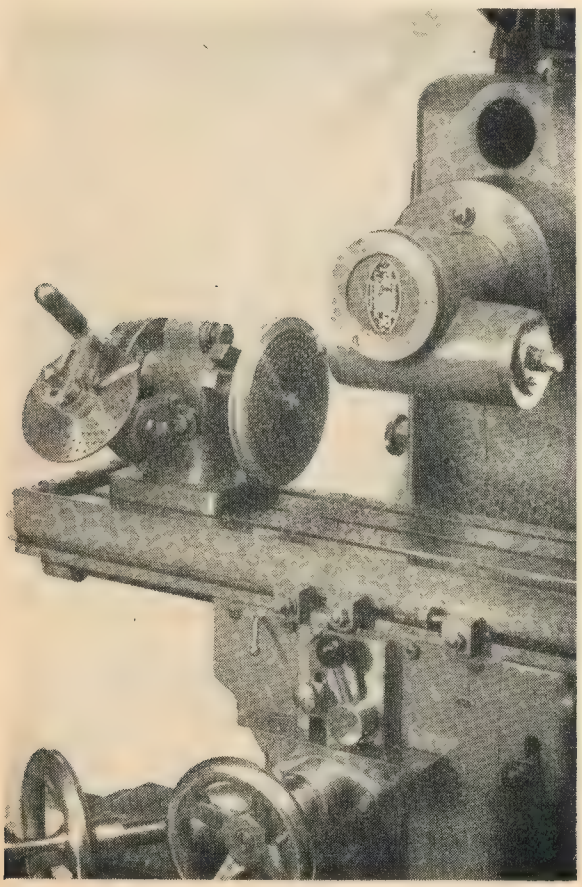
DEAR SIR,—In a recent query, a correspondent raises the question as to inserting a gauze filter in the vaporising system of a blowlamp. As a mechanic with over 40 years experience with the use of blowlamps, I can advise him that a piece of small mesh gauze may be placed in the recess at the back of the nipple with safety. Experiencing trouble with choking due to foreign matter in the paraffin oil, and the bother of frequent pricking out the nipple, I tried this method with success. The piece of gauze should be cut to the depth of the recess, and rolled up so that it fits the recess snugly; this filter will prevent any foreign matter obstructing the nipple and it is easily renewed from time to time. Trusting this hint may be of use.

Yours faithfully,
Enfield, Middx. J. W. COOPER.

[*Mr. Cooper's suggestion is quite practicable, and has been used with success in many cases, though in others it has been found that gauze anywhere in the vaporising system does more harm than good, and blowlamp manufacturers generally advise against it. Our querist suggested inserting a roll of gauze inside the vaporising tubes* before brazing, *and our reply emphasised the inadvisability of inserting it in a position from which it could not readily be removed if necessary.* —ED., "M.E."]

MAKING DIVISION PLATES

DEAR SIR,—The photograph below shows the making of a 5-row steel division plate (60-48-44-36-19) on a "Tom Senior" milling machine and "Tom Senior" dividing head. The vertical milling attachment is rotated to the horizontal position, and a 3/32-in. to ¼-in. shank Slocombe type centre drill head in collet chuck. The micrometer stop on table is so set as to allow the centre drill to produce a slight countersink to make for easy entry of the index pin.



The photograph was taken by the writer with a "Purma" camera. No. 2 supplementary lens, orange filter, fluorescent lighting, exposure 5-sec. Ilford film, medium speed pan.

Yours faithfully,
C. G. S. BUIST.
Alnmouth.

ORIGIN OF "TRAM"

DEAR SIR,—I was most interested in Mr. C. H. Clarke's comments on page 174, THE MODEL ENGINEER, August 5th, 1954. The *Shorter Oxford Dictionary*, dates this word at 1825, but it shows the word "tram" to derive from the Low German "traam" (1500) meaning "balk" or "beam."

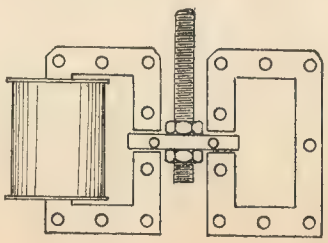
Now Everard, in a paper "Permanentway Developments in Great Britain," presented to the Joint Engineering Conference, 1951, quotes from the will (dated 1555) of one, Ambrose Middleton, of Barnard Castle, in which the repair of a "highway" or "tram" is mentioned, although he points out that this may have referred to a straight piece of road rather than a railway. He further states that a definite reference to rails, presumably of timber on transverse sleepers, occurs in some records of 1597 at Wollaton Hall in Nottinghamshire. I suggest, therefore, that the first use of the word "tram" for a timber railway appears to be in the 16th century. The addition of a vertical flange to the iron "plateway," mentioned by Mr. Clarke, belongs to the 18th century at the earliest, for the first recorded use of iron plates on timber rails was in 1767, at Coalbrookdale.

An interesting complication arises, however. The *Shorter Oxford Dictionary* also states (*c.* 1516) that a "tram" was a quadrilateral frame, or skeleton truck, used in mining for carrying baskets of coal—presumably in the fashion of a Sedan chair. This meaning tends to justify Everard's doubt regarding the exact interpretation of the will of Ambrose Middleton, for it may well be that the first "tramway" was merely a plain highway, or pathway, over which the "tram" with its coal-basket was carried.

Yours faithfully,
Northwood. J. PRITCHETT.

ELECTRIC CLOCK DESIGN

DEAR SIR,—It is some time since we heard anything about the Hipp electric clock in the pages of THE MODEL ENGINEER, but I am sure there must be numbers of your readers interested in making, or experimenting with, this temperamental piece of mechanism. I, therefore, submit the following notes on detail modifications I have incorporated in a clock of this type. Two magnets were made from laminations and mounted on an insulated base. These magnets were wound with 28-gauge enamelled copper wire and connected in parallel. The armature was also laminated, and adjustments made with a nut, top and bottom. The diagram, I think is self-explanatory. This design distributes the power equally to top and



bottom of armature and minimises the thump, so prevalent in some clocks when contact is made. It is connected to the transformer that rings the door bell; this is one of the 3.5 and 8 V type. The clock has been running for over a year now, and gives every satisfaction.

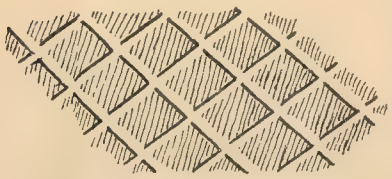
I put in a new contact system at the same time as the magnets, which does away with the contact spring, also the vibration and "twanging" associated with trigger slip. But that is another story. The clockwork was made from the design by Mr. C. R. Jones, for which many thanks to him and THE MODEL ENGINEER.

Yours faithfully,
New Malden. A. S. BATES.

CHEQUER-PLATES

DEAR SIR,—I was interested to see your editorial on this subject in the September 23rd issue, and am sorry to have missed the discussion you refer to. Model marine engines of mine have appeared at many exhibitions, and seldom does one pass without someone commenting to me on my simulated chequer-plating, and making kindly suggestions as to methods of producing a more orthodox presentment.

My invariable reply is that I have tried out most of the known alternatives at one time or another, with uniformly appalling results so far as appearance is concerned, and have always reverted to plain flat plating with incised lines. I will go further, and say I recollect a model factory engine-room in the



A—Appearance of actual full size—The plate is flat and chequering barely perceptible

"M.E." competition a few years ago, the appearance of which was in my view greatly impaired by an attempt at including over-realistic chequer-plating.

At one time I thought it might be merely a matter of scale, and that what did not suit my ½-in. scale models might be satisfactory on a larger one; so I was greatly interested to hear from Mr. Wilcox, this year's cup winner, that he had had exactly the same experience, and had been forced to discard raised chequer-plate for the incised line variety I use myself.

I think the reason for this is somewhat as follows, and I append a couple of rough sketches to make myself clear. Full size plates have the diamonds roughly 3½ in. by 3 in. and the height of the chequering is very slight, not much over 1/32 in., if as much—it is barely perceptible in an actual engine-room, and to the eye, the platform is practically smooth and flat (see sketch A).

In a model reproduction, the chequer ridges should be approximately 0.0015 in. high for ½ in. scale and 0.003 in. for 1 in., and I find it impossible to produce this without creating a series of shallow bowls which entirely destroy the smooth overall platform effect. They reflect light inconveniently, and altogether look so bad that I hastily suppress them.

Some modellers, perhaps are rather anxious to obtrude the fact that they have made plates of orthodox pattern, and to that end make the chequer ridges (I am speaking of the kind made by scribing cross-lines on the

B—"Cobbled yard" effect of lighting on model plating, ridges stand proud 0.005 in. to 0.010 in.—far too high. The uniform flat platform appearance is wholly lost

under side of thin foil and then reversing it and soldering or cementing it to thicker plate) altogether too prominent (0.005 in. to 0.010 in. high, perhaps). This results in what one could call almost a "cobbled yard" effect when tried in ½ in. scale (see sketch B) where the diamonds are only about 5/32 in. × ⅛ in. Conceivably it might prove satisfactory in a much larger scale, but I somewhat doubt it. I have heard of one case in which the foil was rolled out nearly flat again after scribing, and before cementing to thicker plate, but I seem to remember it was not altogether satisfactory. Uncontrollable little kinks developed, and I should think the finished plates would be very difficult to keep clean.

I shall be very interested to see if any discussion will produce a really satisfactory method suitable for small scale —the acid-etched types are too rough and don't look well in a glass-case model. I have thought that thin sheet lead stamped flat with the chequer pattern in a fly press might do the job, but have never tried it; as after more than 30 years' experience I have found nothing more satisfactory for ½-in. scale models than plain flat plate—I use German silver—with fine incised lines.

Yours faithfully,
Blackheath. WM. T. BARKER,
S.M.E.E.

DEAR SIR,—Your recent note in "Smoke Rings" (September 23rd) referring to small-scale chequer-plating prompts me to mention that I described, in detail, a method of making this in THE MODEL ENGINEER dated May 8th, 1947, in an article on my model naval gun.

This was effected by etching in acid, and to the best of my knowledge was an original application of an old idea. It was quick and extremely successful in appearance, as may be judged from one of the photographs illustrating the article; it was adopted after several other methods had been considered and discarded. The advantage about the process is that it can be done in a small workshop without the use of dies, rolls, presses or other gear not usually at the service of the average model engineer.

The method has been used on several occasions by other model engineers, including some members of this society, with success. I have also had excellent specimens of chequer-plating, made in this manner, sent to me from New Zealand, and can recommend it for "true-to-life" results.

Yours faithfully
S. A. WALTER,
(Hon. Treasurer)
Harrow & Wembley S.M.E.

TOOL GRINDING

DEAR SIR,—Mr. Elam's remarks regarding free-hand grinding of lathe tools cannot be allowed to pass unchallenged (THE MODEL ENGINEER, 23/9/54).

With a little care and practice, toolbits and drills, etc., can be ground quite well enough by hand for all practical purposes. The production of innumerable facets on the face of a tool can, to a large extent, be overcome by presenting the heel of the tool to the wheel first and feeling the tool to the correct angle.

Yours faithfully,
Ealing. K. F. HILLIER.

Next Week . . .

CONSTRUCTING AN AIR COMPRESSOR
"Duplex" continues the instructions on machining the components of the vee twin compressor.

STEAM TEST
An analysis of results obtained in a practical working test on a Stuart Turner "Sirius" twin single-acting engine.

CHEQUER-PLATES
Mr. Herbert J. Dyer, well known for his practical articles on workshop technique, makes a useful contribution to this topical and much-discussed subject.

TRACTION ENGINE RALLY
A report of the Traction Engine Rally held at Pickering, will be welcomed by many readers.

A 5-in. GAUGE LOCOMOTIVE
A description and illustrations of a neat 0-6-0 pannier-tank engine for 5-in. gauge by an old friend, Mr. G. W Vickerage.

"NETTA"
"L.B.S.C.'s" notes provide complete information for making the valve-gear of the 5-in. gauge version of this sturdy 0-8-0 locomotive.

WITH THE CLUBS

Society of Model and Experimental Engineers

On Saturday, October 23rd, 1954, a rummage sale will be held at the society's headquarters, 28, Wanless Road, S.E.24, at 2.30 p.m.

It is intended to offer some very useful workshop equipment belonging to the late Mr. Green at this sale, and members who do not enter their lots before 2.30 p.m., sharp, on this day will be asked to leave them over for offer at the next rummage sale.

Members of affiliated societies, but not visitors, are entitled to attend and make bids at this sale, and it is hoped that a large attendance will ensure that a great deal of brisk and lively business is transacted.

The Hatfield and District S.M.E.

The society is holding an exhibition at The Youth Centre, "Breaks," French Horn Lane, Hatfield, from October 21st to 23rd. In addition to numerous models, the society's "O" gauge layout will be making its first public appearance, and the 3½ in. gauge passenger track will be in operation.

This will be a fine opportunity for any prospective member to have a tour of the society's headquarters.

Hon. Secretary: F. W. DUNHAM, 57, Lockley Crescent, Hatfield.

The Manchester S.M.E.E.

At the committee meeting held on October 1st, the following programme of meetings was arranged:—

October 29th: Mock auction.
November 12th: Bits and pieces night.
December 3rd: Talk on "Casting," by Mr. J. Wood.

Hon. Secretary: P. SYMOND, 33, Grangethorpe Drive, Burnage, Manchester, 19.

South Wales and Monmouthshire Federation of Model Clubs and Societies

The number of clubs affiliated to the Federation is increasing, and include model ship, yacht, aircraft and engineering societies. We are considering holding another exhibition in the latter half of 1955 on the lines of the one which was so well supported in December, 1953.

Secretaries of unaffiliated clubs in the area are invited to contact the Hon. Sec.: R. S. PAGE, 11, Tywn-y-Fedwen Road, Gabalfa, Cardiff.

The Marlborough S.M. & E.E. (NewZealand)

The annual general meeting of the society was held in August, and the president in his report outlined the considerable progress that had been made during the past year, and the many amenities that had been provided by members at no cost to the society.

The president, Mr. E. J. Speight; vice-president, Mr. K. M. Fairweather, and hon. secretary, Mr. J. E. Robinson, were re-elected, and an innovation was the election of a volunteer executive committee, and a very useful body resulted.

Preparations and the allocation of duties for the society's forthcoming exhibition were the subject of the September regular meeting of the society.

In view of the great public interest in last year's one-day exhibition, it will this year be staged, not only at the A. & P. Show in a much larger tent, but will then be moved to the Orange Hall in Blenheim for the ensuing week.

Hon. Secretary: J. E. ROBINSON, Scotland Street, Picton, New Zealand.

Stockport and District S.M.E.

The summer activities of the society have been rounded off by track meetings at our Davenport track on September 5th and 26th. On the former date we entertained visitors from the Derby society.

Our annual outing took the form of a trip down the Manchester Ship Canal by the M.V. *Egremont*, from Pomona Dock, Manchester, to New Brighton, the party totalling 55. We were allowed to visit the engine-room during the voyage.

Meetings of the society are held on the first and third Fridays of each month at The Forester's Hall, Churchgate, Stockport, at 7.30 p.m. We shall be pleased to welcome anyone interested at any of these meetings.

Hon. Secretary: D. MAPP, 163, Mauldeth Road, Withington, Manchester, 20.

The Society of Ornamental Turners

The 6th annual general meeting will be held at Stanleys, 1, The Boulevard, Balham, S.W.12, on October 23rd, 1954.

(1) Secretary to read and confirm the minutes of the meeting held on October 24th, 1953.
(2) To elect officers for the ensuing year.
(3) To receive a report from the vice-president.
(4) To receive a report from the hon. treasurer.
(5) To transact any other business which may arise.

Joint Hon. Secretary: HAROLD V. YEATMAN, 35, Hoadly Road, London, S.W.16.

Worcester & District M.E.S.

We had a most successful week-end on the occasion of the opening of our new continuous track of 3½-in. and 5-in. gauges at Diglis. The opening ceremony was performed, on the Saturday, by the Mayor of Worcester, Councillor Mrs. R. Ratcliffe. After cutting the ribbon stretched across the track, she was invited to be the first passenger to ride behind Mr. A. Castle's locomotive *Lady Susan* on its inaugural run. After her trip, which she said she had very much enjoyed, she paid a visit to the exhibition of models on display, and showed great interest in them.

Loco running went on until dusk on the Saturday and started again on Sunday morning at 11 a.m. Our visitors on Sunday included members from Birmingham Society, Sutton Coldfield Society, Bristol Society, and some from as far away as London. On both days, locos from visiting societies were seen making use of the new track, and their owners expressed the opinion that it was quite a good track.

One of the interesting side-shows was a large scale Burrell traction engine owned by one of our members, Mr. F. Holl, and it proved a source of real delight to some of the grown-ups who were privileged to try their skill at driving it. On the Sunday afternoon, yet another of these traction engines arrived, much to the delight of these enthusiasts.

Hon. Secretary: F. L. FUDGER, 23 Camp Hill Road, Battenhall, Worcester.

Harrow & Wembley S.M.E.

On Wednesday, October 27th, at 7.30, Mr Millard, of B.R. Swindon Works, will give a lecture on "50 years of Great Western Railway Locomotives" (illustrated by photographs) at the society's headquarters, Heathfield School, College Road, Harrow (opposite Harrow-on-the-Hill station).

The society's 1954 exhibition will take place on Saturday, November 20th, at Wesley hall, Wembley High Road. In addition to the Challenge Cup Section there will be an open competition section which is open to non-members. Entries may be taken to the hall on Friday evening, November 19th.

Hon. Secretary: K. D. CARTER, "Hedgely," South Approach, Moor Park, Northwood, Middx.

THE MODEL ENGINEER DIARY

October 21st, 22nd and 23rd.—Tyneside Society of Model and Experimental Engineers.—Exhibition at The Chronicle Hall, Newcastle-upon-Tyne.

October 21st, 22nd and 23rd.—Grimsby & District Society of Model and Experimental Engineers.—Bi-annual exhibition at the St. Aidans Church Hall, Grimsby.

October 21st, 22nd and 23rd.—Chester Model Railway Club.—Exhibition at the Town Hall, Chester.

October 27th, 28th, 29th and 30th.—Trowbridge and District Society of Model Engineers.—Annual exhibition at St. James' Hall, Union St., Trowbridge. Open from 10 a.m. to 10 p.m. daily.

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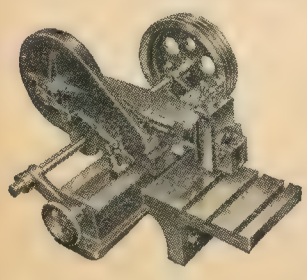

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WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London, N.W.1. Phone: Euston 4661.

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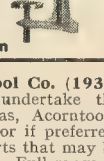

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Drummond 3½" Lathe, maker's stand, treadle, countershaft, overhead milling drive, ½ h.p., 230 V a.c. motor, £20. Buyer collects. Dorking district.—Box No. 7463, MODEL ENGINEER Offices.

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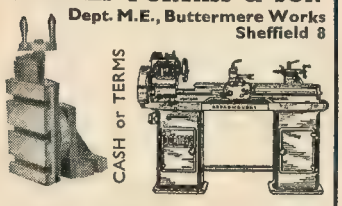

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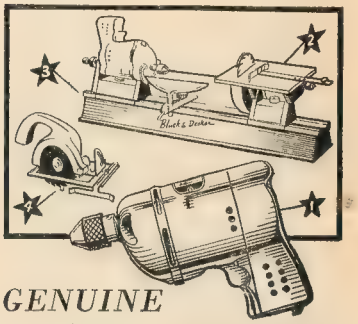

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7005. ½" bore x 1 5/16" x ⅜", **4/3** each, **48/-** doz.
7006. ¼" bore x ⅜" x 7/32", **2/6** each, **27/-** doz.
7007. ¼" bore x ⅜" x 5/16", **1/9** each, **18/-** doz.
7008. ⅝" bore x 1 9/16" x 7/16", **4/6** each, **51/-** doz.
7010. 12 mm. bore x 32 mm. x 10 mm. shielded one side, **4/-** each, **45/-** doz.
7011. 7 mm. bore x 22 mm. x 7 mm., self-aligning, **2/3** each, **24/-** doz.
7012. 7 mm. bore x 22 mm. x 7 mm., **2/3** each, **25/-** doz.
7013. 7 mm. bore x 22 mm. x 7 mm., 2nd class, **1/2** each. **13/-** doz.
7014. ⅛" bore x ⅜" x 5/32", **2/3** each, **25/-** doz.
7015. 10 mm. bore x 28 mm. x 8 mm. angular contact, **3/6** each, **39/-** doz.
7016. 84 mm. bore x 102½ mm. x 11 mm. angular contact, **3/-** each, **33/-** doz.
7017. ½" bore x 1 5/16" x ⅜" angular contact, **4/6** each, **50/-** doz.
7018. 5 mm. bore x 16 mm. x 5 mm., angular contact, **2/-** each.
7019. ¼" bore x ⅜" x 5/16" inner and 7/32" outer shielded. **2/-** each. **21/-** doz.
7020. STEEL BALL. 2⅛" dia. precision ball bearing, wt. 2¼ lb., **2/6** each.
7021. 5/16" bore x ⅜" x 5/32", **2/-** each, **21/-** doz.
7022. ⅜" bore x ½" x 7/32", **2/6** each, **27/-** doz.
7023. 5/16" bore x ⅜" x ⅜" inner and ½" outer. Control rod end self-aligning, shielded, **2/-** each, **21/-** doz.
7024. ¾" bore x 1⅝" x 5/16", **3/6** each, **39/-** doz.

I also have over 15,000 other Races. Ask for the size you want, I may have it.

NEW MIXTURES

8024. **B.A. Nuts,** full plain steel, 2, 4 and 6-B.A. approx. 8 doz. each size, **4/6** for 2 gross.
8024A. **B.A. Nuts,** full plain brass, 2, 4 and 6-B.A., approx. 8 doz. each size, **6/-** for 2 gross.
8024B. **B.A. Nuts,** 2, 4 and 6-B.A., approx. 8 doz. each size. Steel self-locking (Simmonds, Aerotite, etc.), **4/6** for 2 gross.
8025. **6-B.A. C.H. Screws** up to 1" long, chiefly plated steel, 3 gross for **5/-.**
8026. **Rubber Grommets,** 3/16" to ⅜" bore, various types, **6/-** gross, **3/6** ½ gross, **6d.** doz.

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3052. **Micro Switch.** High sensitivity switch. 5 amp, 250 volt, A.C., 3 contacts, single pole, double throw, can be used as normally open or normally closed, **4/-** each.
3048. **Miniature Micro Switch.** 1¼" x ½" x ½", 250 volt, A.C., 3 amp. Can be used as normally open or normally closed, **3/-** each. Other micro switches from **2/6** each.
3082. **Electric Blanket,** heating cord 27 yd. evenly spaced over an area of 12 sq. ft. Makes 230 volt blanket. 25 ohms/yd. may be loaded up to 1 amp for other heating jobs. 27 yd. length with instructions, **17/6.** Instructions only, **1/-.** Other lengths **1/-** yard.

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6003. **Tool Clip.** Grips nominal ⅜" dia. Roller entry type, **2d.** each, **1/9** doz.
6007. **Ball Oilers** for pressing into ¼" dia. holes almost flush, spring loaded ball keeps dirt out. Nickel plated, **5d.** each, **3/6** doz.
6010. **Grease Nipples,** Tecalemit type. Straight and angles. All ¼" B.S.F. **6d.** each, **5/-** doz. assorted or all one sort
6010A. **Grease Nipples,** 2-B.A. straight, 4-B.A. hex., **4d.** each, **3/6** doz.
6011. **Flip Flap** type oilers to push into ¼" dia. holes, **6d.** each, **5/-** doz.

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All goods on 28 days' approval against cash. **15/-** worth and over post free (inland). Please send plenty of postage under 15/-. Surplus WILL be refunded.

Other adverts. worth looking up. 16th Sept. and 19th August. (Remember the one where I gave every reader **2/6** worth ?).

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16	.281″	2/6	60	.969″	5/-
20	.344″	2/9	64	1.031″	5/3
24	.406″	3/-	72	1.156″	5/6
30	.500″		84	1.344″	6/6
32	.531″	3/3	96	1.531″	7/3
36	.593″	3/6	100	1.594″	7/6
40	.656″	3/9	120	1.906″	9/6

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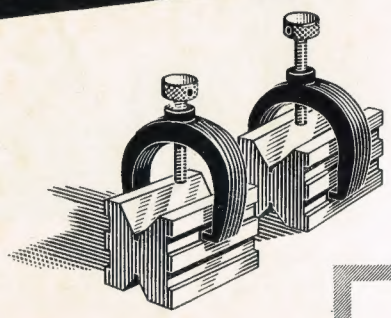
Eclipse

the name for good tools



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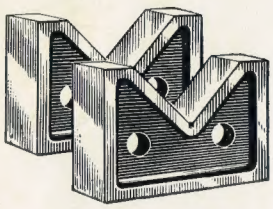

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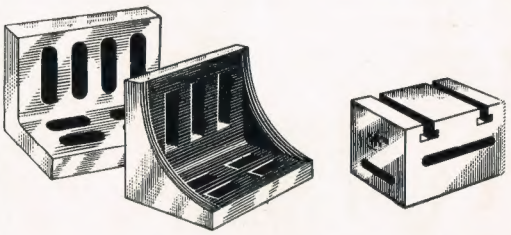

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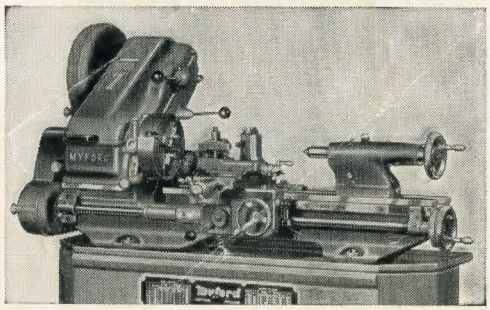

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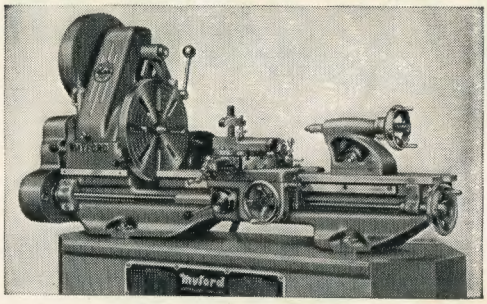

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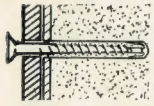

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